Software Process Improvement Roadmap

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The ideas and findings in this report should not be construed as an official DoD position. It is published in the interest of scientific and technical information exchange.

Review and Approval

This report has been reviewed and is approved for publication.

FOR THE COMMANDER

(signature on file)

Thomas R. Miller, Lt Col, USAF
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About This Roadmap

The *Software Process Improvement Roadmap* is the product of a strategic collaboration between the Carnegie Mellon University Software Engineering Institute (SEI) and the Hewlett-Packard Company. The information in the roadmap is based on the application of software process improvement practices and the lessons learned from these experiences. Concepts in the roadmap were proven with the SEI client base within the Department of Defense and the internal Hewlett-Packard clients.

The roadmap is also based on the work of several projects at the SEI. SEI projects whose work contributed directly or indirectly to the material in this roadmap are: Capability Maturity Model, Software Process Assessment, Software Capability Evaluation, Organization Capability Development, Software Process Measurement, and Software Process Definition.

Organization of the Roadmap

We describe six major activities of software process improvement in Chapters 1.0 through 6.0. In general, we limit the chapter structure to three levels of detail. We provide additional detail in the appendices:

- Appendix A.0: Taxonomy of Software Process Improvement Plans and Charters (page 145).

- Appendix B.0: Components of the Software Process Improvement Infrastructure (page 159).

- Appendix C.0: Charters and Templates (page 175).

- Appendix D.0: Establish Organization Process Maturity Baseline (page 193).

Following these appendices, we provide a glossary (page 205). When we introduce a new term or key phrase in the text for the first

time, we print the term or phrase in **bold** typeface to indicate that it is defined in the glossary. There is also an index on page 209.

Acknowledgments

The authors gratefully acknowledge the contributions of the many people without whom this book would not have been possible.

The work upon which this roadmap is based had many key contributors. For a list of the important published findings in the field of software process improvement, please refer to the SEI *Annotated Listing of Documents.*[1]

We would particularly like to acknowledge Gene Bounds and Rich Pethia at the SEI for their support of this project. Russ Reed of Sematech and Linda Ibrahim of the SEI participated in the final review of this draft and provided valuable insights.

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1. Available from Research Access, Inc., 800 Vinial Street, Pittsburgh, PA 15212.
   Phone: 1-800-685-6510. FAX: (412) 321-2994

Introduction

Overview

This document describes a generic software process improvement (SPI) program roadmap, a long-range, integrated plan for initiating and managing a SPI program. The purpose of this document is to provide process improvement managers with a generic description of the recommended steps for SPI.

Figure I-1 on page 2 shows a high-level view of the roadmap. The roadmap is intended to address two operational levels:

- A strategic level, in which there are processes that are the responsibility of senior management.

- A tactical level, in which processes are executed by line managers and practitioners.

Figure I-1 text content:

1.0: Initiate Software Process Improvement

2.0: Manage the Software Process Improvement Program

3.0: Build Software Process Improvement Strategy

4.0: Baseline Current State

Establish maturity baseline

Establish process baseline

Establish metrics baseline

Communication, Commitment, & Involvement

5.0: Develop Improvements

6.0: Deploy Improvements

Strategic Level

Tactical Level

Initiating Phase

Baselining Phase

Implementing Phase

Phases

Figure I-1: High-level View of Process Improvement Roadmap

The flow depicted in Figure I-1 is a continuous flow. As improvement activity is completed, both the strategic-level and tactical-level activities return to *1.0, Initiate Software Process Improvement,* where management commitment is reaffirmed, new baselines are planned, or strategy is redirected.

The roadmap describes a process improvement program that occurs in three phases, made up of six major activities within these phases. The three phases are

1. *Initiating* process improvement; analogous to the "Initiate" phase of the Software Engineering Institute (SEI) IDEAL model.

2. *Baselining* or understanding the current processes and opportunities; analogous to the "Diagnosing" and "Establishing" phases of the IDEAL model.

3. *Implementing* process improvement by developing and sustaining improvements within the organization; analogous to the "Acting" and "Leveraging" phases of the IDEAL model.

Structure of the Roadmap

As shown in Figure I-1 on page 2, the roadmap consists of six main activities. These activities describe a set of **process**es that are executed during the implementation of a SPI program. Descriptions of these activities comprise the remaining six chapters of this roadmap. The major activities in Figure I-1 match the chapters within the document and are made up of a number of subactivities.

The activities in the roadmap are listed and briefly summarized in the following table:

Process Name	Process Purpose	See Page
1.0: Initiate Software Process Improvement	Learn about process improvement, commit initial resources, and build process infrastructure.	7
2.0: Manage the Software Process Improvement Program	Track improvement projects and resolve issues.	43
3.0: Build Software Process Improvement Strategy	Develop strategic and tactical plans for specific improvements.	69
4.0: Baseline Current State	Establish current levels of process maturity, process descriptions, metrics, etc.	99
5.0: Develop Improvements	Research and develop solutions to process problems.	103
6.0: Deploy Improvements	Expand successful process improvements to entire organization.	125

In general, the chapter structure has been limited to three levels of detail. Additional detail is provided in the appendices.

The roadmap is intended to be general and does not presuppose or force any particular methodology. For a list of sources that can be used to support and help ensure a successful SPI program, see the SEI *Annotated Listing of Documents*.[1]

Purpose

The roadmap is intended to provide an organization with a guide to forming and carrying out a SPI program. It is written primarily from the point of view of the organization setting up the program, not from an external consultant's or solution provider's point of view. The expected users are the champions of SPI, mainly SPI program managers. Other users include senior managers, line managers, and individuals who are interested and/or have a stake in improving the software development capability of the organization.

Some Assembly Required: One Size Does *Not* Fit All!

The roadmap is organized in a best-case sequence. However, there will always be real-world events that prevent organizations from following a set sequence in process improvement. SPI managers must tailor the roadmap to their particular situation of process improvement. The sequence presented here is recommended because as baselines are completed, the SPI managers and practitioners will come under increasing pressure to produce plans and actions. Because it will be difficult to allocate time for organizing and planning later in the process, managers must make sure that time is allocated up front. Clear understanding of what will be done and when it will be done will be invaluable for maintaining the momentum of a SPI program.

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The roadmap recommends that 1-3% of an organization's personnel be applied to managing and executing SPI. Given these recommendations, the roadmap is intended to be used by organizations that are large enough to assign at least one full-time and one part-time person to SPI. At least two people are needed to provide synergy and back-up in activities. Thus organizations with fewer than 50 people will have difficulty sustaining SPI if they do not commit to the minimum recommended personnel assignments. Furthermore, such organizations may not be complex enough to require the additional infrastructure for SPI.

On the other hand, process groups in large organizations can become too bureaucratic and may lose contact with the technical staffs they are designed to help. Large organizations (more than 600 people) should divide process groups into the corporate organizational model described in this document (see page 53).

Organization vs. Corporate Considerations

The roadmap is primarily focused on organization-specific activities. To be successful, such activities do not require a corporate program. A corporate program cannot fulfill all (or many) of the functions of an organization program:

- It is too far away.

- There is too much "normalization." That is, the organization subcultures are too different for a single set of practices and solutions.

- There are never enough resources (resources would be spread too thin).

However, the roadmap does include those activities for which a corporate office would be responsible. Within a corporation that is made up of a number of separate organizations, there may and probably will exist a hierarchy of SPI programs. The corporate program would perform activities in its corporate context, including

- Establishing infrastructure and links to support and coordinate the organization programs.

- Looking outside the corporation for "process reuse."

- Supporting organizational roadmap activities through resources, common practices, communication, etc.

- Spreading findings, practices, information, etc., across a wider base within the corporation.

- Acting as a focal point for outside process improvement influences, such as those from the SEI, ISO 9000, etc.

1.0   Initiate Software Process Improvement

Overview

This is the initial step in the roadmap, where the organization's senior management first understands and commits to a software process improvement (SPI) program and then defines the context for SPI. Although process improvement is cyclical, this context-setting step occurs only once, when the SPI program begins.

This step is similar to the definition of a new system. A plan and schedule are developed, major functional elements defined, and key interfaces and requirements defined and agreed to. Typically a **discovery team** is formed to explore the issues and to develop a SPI proposal to senior management. Following the approval of the SPI proposal, the infrastructure for launching the SPI program will be formed.

Each organization should decide how it will organize its improvement efforts; who will be involved, both at the practitioner and management levels; and how much of those people's time will be allocated to the effort. Based on these initial decisions, the charter and staffing for the **management steering group (MSG)**, **software engineering process group (SEPG)**, and other organizational entities are assigned. These entities then develop working procedures, plans, and schedules to steer the organization through the process improvement program. Appendix B.0, Components of the Software Process Improvement Infrastructure (page 159), further defines the organizational structures.

Planning is very important in this step. Once baselining efforts are under way, the MSG and SEPG will come under increasing pressure to produce. It is usually very difficult to allocate enough time at that point to organizing the effort. A clear understanding by both the MSG and the SEPG of what will be done, how, and when, before the

baselining activities, is essential for setting the stage for effective work afterwards.

Purpose   The purpose of this step is to

- Launch the SPI program by building an understanding and an awareness of the costs and benefits.

- Determine the business needs for process improvement.

- Commit the resources necessary.

- Form the initial infrastructure needed to implement and manage the program.

During this process there will be three main outputs:

1. A SPI proposal to senior management.

2. An infrastructure to initiate and manage the program.

3. A SPI implementation plan for all activities through the baselining step.

Objectives   The objectives for this step are listed by team in the table below:

Team	Objective
Discovery Team	Build initial awareness, skills, and knowledge to start SPI.
	Determine business objectives related to SPI.
	Determine readiness to proceed.
	Create a proposal for a SPI program, outlining the needs for SPI, the scope of the program, and resource requirements. Also, recommend an overall schedule and infrastructure to manage the program.
Senior Management	Commit the resources to accomplish the next steps.
	Create organizational components for a SPI program.
	Commit in principle to the overall process.
MSG and SEPG	Plan for the next step and commit to the next steps.

Table 1-1: Objectives

Education/Training   Because the organization is just starting to learn about SPI and how to go about launching a SPI program, this step requires substantial education and training. The table below shows the breakdown of education and training needs:

Team	Software Process Maturity Overview	Software Process Improvement Overview	Software Process Improvement Roadmap Overview	Managing Technological Change	Planning a SPI Program
Discovery Team	X	X	X		
Key Organization Stakeholders	X	X		X	
Senior Management	X	X		X	
MSG	X	X	X	X	X
SEPG	X	X	X	X	X

Table 1-2: Education and Training Needs

Commitment   Commitment is key to this step. Without strong, informed, and steadfast commitment and sponsorship from senior management, the effort is doomed from the start. If the champion cannot obtain the level of commitment described in this roadmap, the effort is better deferred until the commitment is present.

Senior management's initial commitment is to

- Allow the discovery team to form and to explore the issues and develop a SPI proposal.

- Provide the discovery team with the business need for process improvement.

This is followed by committing to implement the SPI proposal and backed up by assigning resources to the SEPG and creating other necessary SPI infrastructure elements.

The line management **stakeholders** also must

- Commit time and effort to participate in SPI.

- Form and commit time to the MSG.

- Plan to manage the SPI program and develop a strategy in the steps that follow.

Prospective SEPG members also must commit time to work on the SEPG and understand that this commitment could result in a substantial change in their work assignments within the organization.

Communication   The discovery team will regularly communicate the results of its work to the whole organization and to key organization stakeholders and senior management in particular. These communications take the form of general information exchanges about what the team is learning and what is happening, along with specific requests for decisions and commitment from senior management.

Senior management must communicate the business objectives, rationale for the SPI program, and the urgency of those efforts. They must show to the organization active commitment to the effort.

Once the infrastructure is formed, the MSG and SEPG must maintain a steady flow of information throughout the organization about what is happening. In the absence of any specific information, people tend to assume the worst. A change effort of this magnitude causes substantial fear throughout the organization; resistance to change will show up for a variety of reasons. Regular and effective communications can alleviate some of that concern.

Entry Criteria   Organizations may initiate a SPI program because of some disaster or impending disaster in their business that includes their software capabilities, or through a desire to maintain or improve a competitive edge through the quality and productivity of their software processes. Usually there are one or more champions of SPI who lobby to get an effort started and investigate ways to launch a program. The key entry criteria are

- Critical business need to improve software quality and productivity.

- Organization champion(s) for SPI.

Exit Criteria
- The SPI infrastructure has been established and is reinforcing sponsorship and promoting SPI concepts and activities.

- An initial, organization-specific SPI implementation plan has been created for organizing and launching the SPI program.

Tasks   The figure below is a pictorial representation of tasks for Step 1.0,
                        Initiate Software Process Improvement.

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                        ┌─────────────┐
                        │     1.1     │
                        │ Get Started │
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        ▼                      ▼                      ▼
┌─────────────┐       ┌─────────────┐       ┌─────────────┐
│     1.2     │       │     1.3     │       │     1.4     │
│  Identify   │       │   Build a   │       │ Educate and │
│  Business   │       │  Proposal   │       │    Build    │
│  Needs and  │       └─────────────┘       └─────────────┘
│  Drivers for│              │                      │
│ Improvement │              │                      │
└─────────────┘              │                      │
        └────────────────────┼──────────────────────┘
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                      ┌─────────────┐
                      │     1.5     │
                      │   Obtain    │
                      │  Approval for│
                      │ Proposal and│
                      └─────────────┘
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        ▼                                           ▼
┌─────────────┐                            ┌─────────────┐
│     1.6     │                            │     1.7     │
│Establish the│                            │ Assess the  │
│  Software   │                            │ Climate for │
│   Process   │                            └─────────────┘
│ Improvement │                                   │
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                      │     1.8     │
                      │ Launch the  │
                      │   Program   │
                      └─────────────┘
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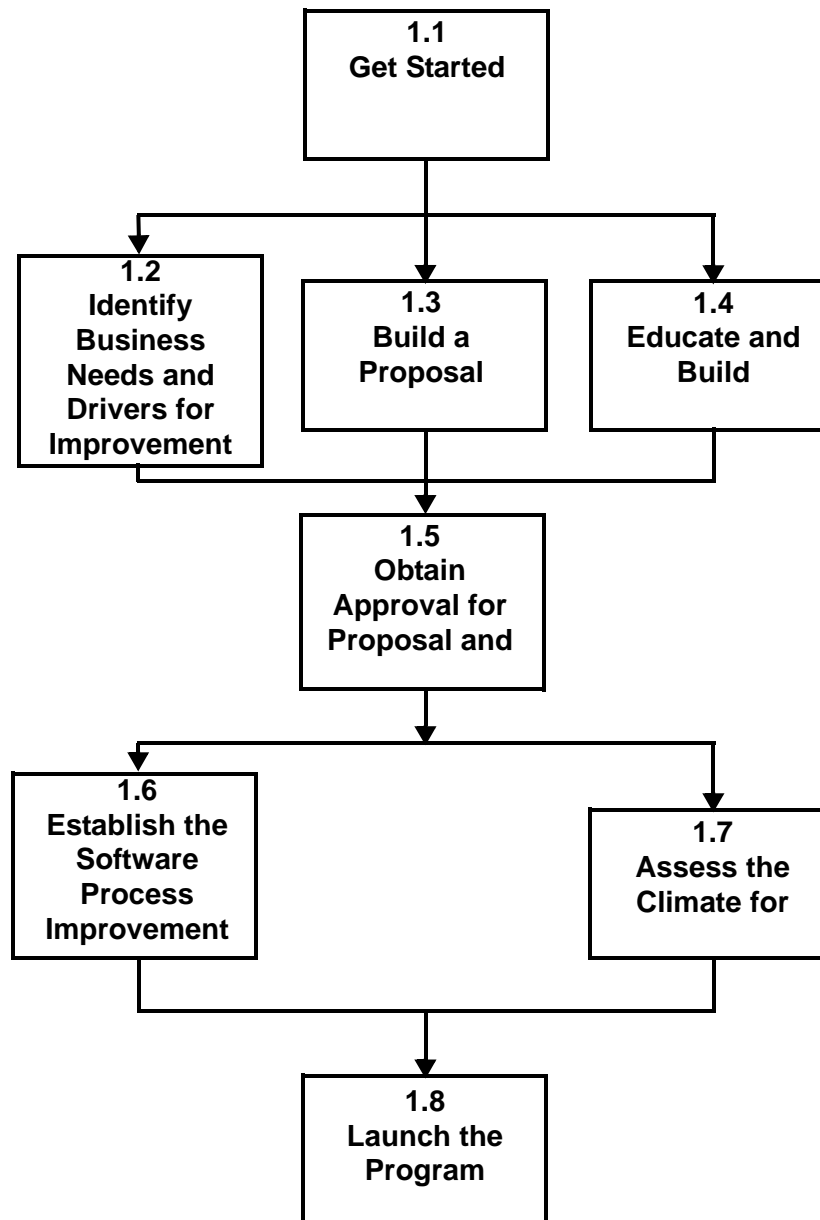
Figure 1-1: Process Flow for Initiating Step 1.0

1.0   Initiate Software Process Improvement

The subtasks for Step 1.0, Initiate Software Process Improvement, are

Subtask	Page Number
1.1: Get Started	14
1.2: Identify Business Needs and Drivers for Improvement	16
1.3: Build a Proposal	18
1.4: Educate and Build Support	21
1.5: Obtain Approval for Proposal and Initial Resources	23
1.6: Establish the Software Process Improvement Infrastructure	25
1.7: Assess the Climate for SPI	40
1.8: Launch the Program	42

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1.1   Get Started

Purpose   The purpose of this activity is to organize a discovery team to put to-
                       gether a proposal to management for launching a SPI program. This
                       team will gather information about

- Current business needs, organizational policies, and regulations
  that may affect a SPI program.
- Other change programs in the organization that are under way or
  planned.
- Ways to run a SPI program.

The team will then select a specific approach.

Objectives
- Identify organizations that are stakeholders in a SPI program.
- Evaluate and select an approach to conducting the SPI program.

Entry Criteria
- Critical business issues driving process improvement.
- A desire to improve software quality and productivity.
- Organization champion(s) for SPI. The champions may come
  from anywhere in the organization, including practitioners and
  middle or senior management. There may be several champions
  within the organization or only one.

Exit Criteria
- The SPI discovery team exists.
- Existing initiatives, policies, and regulations that will affect the
  creation of a SPI program have been identified.
- An approach to launching and conducting a SPI program has
  been selected and support agreements have been established.
  The roadmap is such an approach, but it requires tailoring and
  customizing to the local environment.

Outputs
- List of initiatives, policies, and regulations and a preliminary
  analysis of their effect, either as barriers or leverage points.

- SPI support (consulting) agreement.

Tasks
- Form a discovery team.

    - Select a SPI champion with the necessary leadership skills to lead the team and do early planning and sponsorship building.

    - Select representatives of stakeholder groups to be involved in the development of the SPI plans.

- Identify the SPI climate for change.

    Identify current policies, regulations, and initiatives that will support or impede the launching of a SPI program. For example, a company may have a policy regarding annual management training; may be subject to government agency regulations, such as the Food and Drug Administration; or may have an initiative to achieve ISO 9001 certification. These all may affect a SPI program.

- Get information on how to do SPI.

    - Identify different approaches and support groups.

    - Select an approach that fits the needs and environment of the organization best.

    - Establish consulting and training support for the approach selected.

1.2   Identify Business Needs and Drivers for Improvement

Purpose

The purpose of this step is to understand, from a management perspective, the key business needs driving the need for a SPI program.

SPI champions usually have many good reasons why an organization should launch a SPI program, but their reasons are rarely couched in business terms or aligned with the organization's business needs. This activity will establish the need for a SPI program in management business terms, aligned with current business needs.

Objectives

- Identify key business needs that drive a need for SPI.

- Link SPI program to business needs.

Entry Criteria

- The SPI discovery team exists.

- Senior management has articulated the organization's business strategy.

Exit Criteria

The key business needs have been defined and links established as drivers to a SPI program.

Outputs

- Business needs and drivers for proposal and SPI strategic action plan.

- Description of the desired state of process improvement for the organization.

Tasks

- Collect business needs.

    - Review current vision statements and SPI business focus.

    - Collect any current needs identification documents.

    - Interview key management stakeholders.

- Review needs to determine those that can be fully or partially satisfied through a SPI program.

- Define how the SPI program can satisfy the needs.

1.3   **Build a Proposal**

Purpose   The purpose of this step is to build a proposal for senior management
                         that will explain what the SPI program is, why it should be initiated,
                         what it will cost, how long it will take to see results, and what ap-
                         proach is selected. The proposal should answer the questions: "What
                         do we want to do?" and "Why do we want to do it?"

                         This will lead to the next management decision point, at which man-
                         agement decides whether or not to go ahead with the SPI program
                         (see Step 1.5, Obtain Approval for Proposal and Initial Resources on
                         page 23).

Objectives   Develop and deliver a SPI proposal.

Entry Criteria   •   The SPI discovery team is formed and in place.

                         •   Existing initiatives, policies, and regulations that will affect the
                              creation of a SPI program have been identified.

                         •   An approach to launching and conducting a SPI program has
                              been selected and SPI consulting support agreements estab-
                              lished.

                         •   Business needs and drivers for the proposal are defined.

Exit Criteria   The proposal is completed and ready to be delivered.

Outputs   •   Completed proposal.

                         •   Organization communication plan.

Tasks   •   Identify key management stakeholders to

                              -    Get inputs for the proposal.

                              -    Send draft proposal to them for review and comment.

- Come to consensus with senior management on the problem(s) addressed by the SPI program proposal.

- Establish goals and objectives for the improvement program, ensuring consistency with business objectives and critical business needs previously identified.

- Develop a vision of the desired state of the organization's process maturity.

- Determine scope.

    - Which organizations (R&D, marketing, manufacturing, quality, etc.) will be included.

    - What kinds of software (product, embedded, mission, support, etc.) will be included.

- Determine organizational structure for managing and coordinating the SPI program, including roles and responsibilities of

    - Senior management.

    - Organization support groups.

    - Corporate support groups.

    - SEPG (determine membership based on scope of improvement program).

    - MSG (determine membership based on scope of improvement program, funding sources, and management control requirements).

    - Other entities.

- Develop high-level plan.

    - Initial high-level activities and schedule through SPI program launch.

    - Determine basic resource requirements (people, travel funds, equipment, consultants), primarily for the SEPG, key managers, and staff in line organization and expected baselining teams.

- Determine benefits to the organization, such as business value (include return on investment if appropriate), improved capabilities, morale.

- Write the proposal to senior management.

- Conduct reviews to refine draft proposal with key stakeholders.

1.4   Educate and Build Support

Purpose   The purpose of this activity is to create awareness, set expectations, and build support for the SPI program across as much of the organization that will be affected by the SPI program as possible. This activity starts early and continues throughout the entire program, adjusting the type and level of information presented to match the current step and level of activities.

The intent is to answer the question "What is going on and why are we doing this?" Support is built by involving the people affected by the program in the early, defining parts of the program when they can more easily make a difference and increase their stake in the outcomes.

Objectives   • Communicate the business need for SPI to the organization.

• Involve key stakeholders in communicating and forming the SPI program.

Entry Criteria   • The SPI discovery team is formed and in place.

• Existing initiatives, policies, and regulations that will affect the creation of a SPI program have been identified.

• An approach to launching and conducting a SPI program has been selected and SPI program support agreements established.

Exit Criteria   Messages that must be communicated at this point in the program have effectively reached their audiences.

There is no real exit from this activity, as the need to educate and build support for process improvement continues throughout the program.

Outputs   • Organization communication plan.

- Briefing kits for communication sessions

Tasks

- Build (or obtain) a series of briefings that can be tailored to various organization components covering what the effort is all about, why it is being initiated, how it will affect the audience, and what the desired outcomes are.

- Develop a briefing plan to cover

  - Senior managers and their staff.

  - Software managers and their staff.

  - Software practitioners.

  - Corporate senior managers (if applicable).

- Enlist key stakeholders to deliver briefings where possible or appropriate.

- Brief organization in as many different forums as possible.

  - Establish dialogues with key stakeholders during briefings to help form the SPI program.

  - Follow up with key stakeholders to get feedback and buy-in.

1.5   Obtain Approval for Proposal and Initial Resources

Purpose   Present the SPI proposal to senior management and get their approval and allocation of time and resources necessary to launch the SPI program.

There may be some iteration from Step 1.1, Get Started (page 14) through this step (1.5) until agreement is reached on the proposal and resources to continue or abandon.

Objectives
- Obtain approval and resources from senior management and buy-in from other key stakeholders.
- Obtain resources for SEPG.
- Obtain senior management time participation in follow-on activities (MSG, assessing climate, launching SPI, etc.).

Entry Criteria
- Business rationale for establishing a SPI program is clear.
- The proposal is completed and ready to be delivered.

Exit Criteria
- Proposal approved and resources allocated.

or
- Proposal rejected and program cancelled.

Outputs
- Approved proposal.
- Allocated resources.
- Updated organization communication plan.

Tasks
- Present the proposal to the key organization stakeholders and senior management.
- Obtain approval of the proposal.
- Allocate initial resources to begin work (primarily the SEPG at this point).

- Establish funding strategy (identify who is responsible for providing and managing what resources).

- Budget for needed resources.

- Find/obtain/distribute resources, including senior management time to participate in follow-on activities.

- Update the organization communication plan.

1.6   Establish the Software Process Improvement Infrastructure

Overview   To effectively manage the SPI program, an infrastructure must be in place or created. The elements of the infrastructure must have clearly defined duties and responsibilities along with authority to properly ensure the success of the SPI program. Appendix B.0, Components of the Software Process Improvement Infrastructure, on page 159 describes the process improvement infrastructure in more detail.

The primary purpose for establishing an infrastructure for a SPI program is to build the mechanisms necessary to help the organization institutionalize continuous process improvement.

The infrastructure established with any SPI program is critical to the success of that program. A solid, effective infrastructure can sustain a developing SPI program until it begins to produce visible results. A good infrastructure can mean the difference between a successful SPI program and a failure. Unsupported SPI programs can become isolated and die out during periods of stress and tension within their organizations.

Infrastructure concepts apply to both local (site) SPI programs and to corporate programs that consist of many different sites, each running its own local SPI program. When the individual SPI programs are a part of a larger organization, there are activities that can be done and mechanisms that can be established that will help ensure that the individual programs

- Survive and are effective.

- Provide economies of scale with reduced site costs.

- Enhance sharing of lessons learned across multiple sites.

The infrastructure will validate the program and lend credence to the efforts. The infrastructure will guide and monitor the SPI program and facilitate allocation of resources. The infrastructure will also in-

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teract with external groups to maintain an awareness of the state of the practice relating to process improvement.

When establishing the SPI infrastructure, the size, structure, and culture of the organization undertaking the SPI must be considered. This along with any geographic considerations will guide the creation of the SPI infrastructure so that management's view of the SPI program is absolutely clear.

At the core of the improvement infrastructure is the software engineering process group (SEPG) that facilitates the SPI program. There should also be a local MSG to advise the SEPG and monitor its efforts. For larger organizations that span multiple sites, or for efforts that span several organizations, a representative from each of the SEPGs or MSGs should meet to coordinate process improvement activities across several SEPGs. In very large organizations, there should be an **executive council** (EC) to deal with strategy and direction for the organization's SPI program. **Technical working groups (TWGs)** or **process action teams (PATs)** will come and go, existing for finite periods of time to accomplish their goals. These different entities are further described in Appendix B.0, Components of the Software Process Improvement Infrastructure (page 159), which also includes sample charters for each entity.

SPI is a significant undertaking for an organization, and it is almost impossible to accomplish anything without a supporting infrastructure. The infrastructure will do a lot of things for the SEPGs and TWGs that are on the front lines trying to accomplish process improvement. The infrastructure can

- Provide resources when they are needed.

- Provide counseling about the direction, scope, and speed of the effort.

- Clear the way so the SPI program proceeds smoothly.

Purpose
- Maintain visibility for the SPI program.

- Facilitate and encourage information sharing.

- Retain lessons learned and improvements developed.

- Provide a support resource.

Figure 1-2 on page 28 shows these elements as they support SPI.

Objectives
- Establish the infrastructure.

- Start ongoing infrastructure activities:
    - Facilitate the SPI program.
    - Advise and monitor the efforts of the SEPG.
    - Coordinate process improvement activities.
    - Provide visible and effective sponsorship for the SPI program

Entry Criteria
- SPI Proposal approved and resources allocated.

Exit Criteria
- Infrastructure defined in terms of specific people, organizational entities, roles and responsibilities, and interfaces.

- Infrastructure in place and operating.

Although the task of establishing the infrastructure has a definite exit, many of the activities that are begun in this task start continuous, ongoing activities that last for the life of the SPI program.
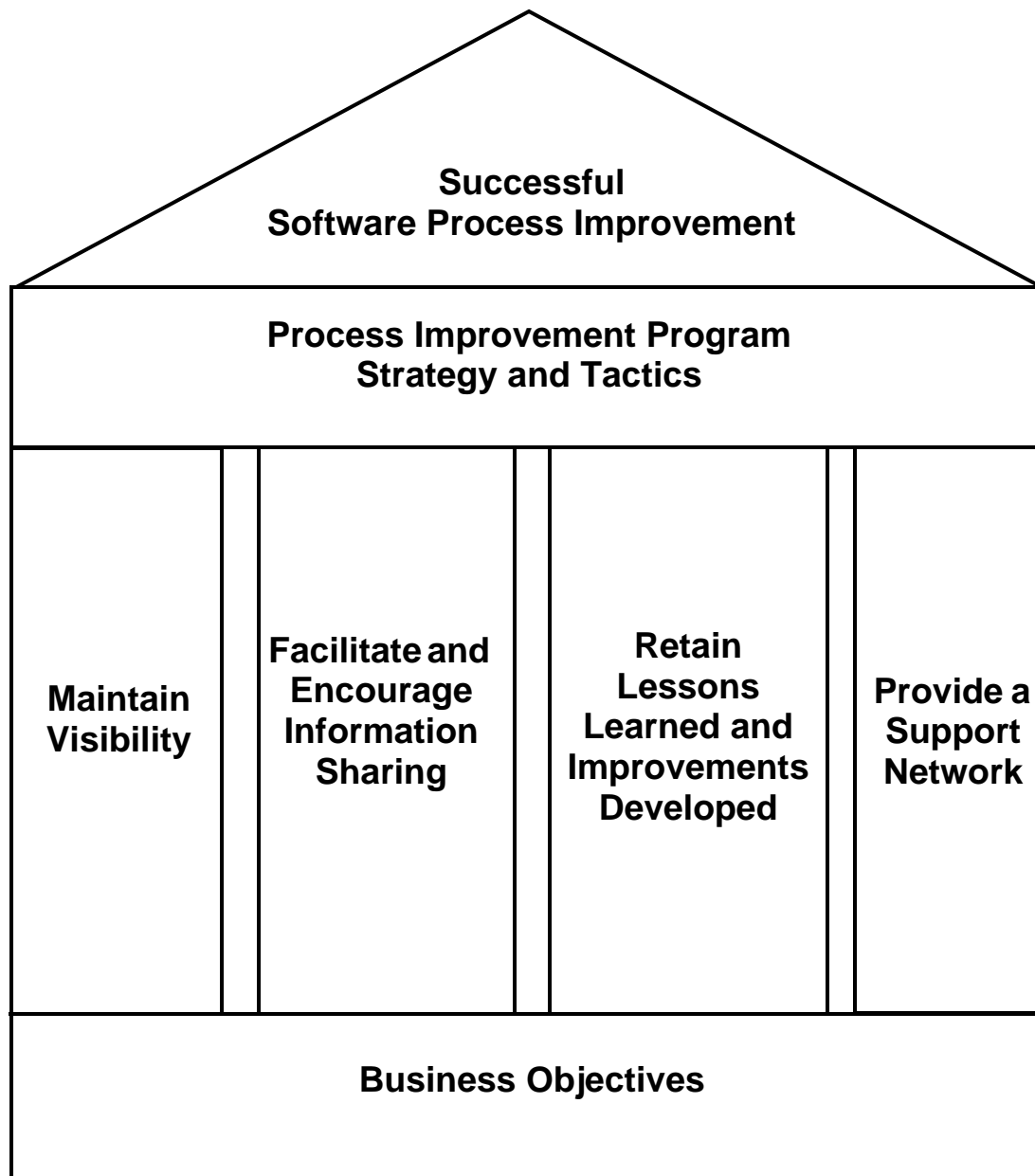
Figure 1-2: Infrastructure for Successful Process Improvement

Tasks   The subtasks for Step 1.6, Establish the Software Process Improvement Infrastructure, are

Subtask	Page Number
1.6.1: Establish the Management Steering Group (MSG)	30
1.6.2: Establish the Software Engineering Process Group (SEPG) (Responsibility of MSG)	31
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1.6.1   Establish the Management Steering Group (MSG)

If a similar group already exists, revise/expand their charter to reflect this new responsibility. See Appendix B.0, Components of the Software Process Improvement Infrastructure (page 159), for more information on the various infrastructure entities and their definitions.

- Select members, chairperson.

- Define roles and responsibilities.

- Define relationship with the SEPG, TWGs and other parts of the organization, including reporting requirements.

- Develop/revise charter for MSG.

- Conduct team building for MSG (and between MSG and any other entities defined).

1.6.2   **Establish the Software Engineering Process Group (SEPG) (Responsibility of MSG)**

If a similar group already exists, revise/expand their charter to reflect this new responsibility. See Appendix B.0, Components of the Software Process Improvement Infrastructure (page 159), for more information on the various infrastructure entities and their definitions.

- Determine SEPG member qualifications.

- Select SEPG members.

- Define SEPG roles and responsibilities.

- Refine relationship with MSG.

- Define relationships with TWGs and the rest of the organization, including reporting, tracking, and support requirements.

- Select SEPG leader (if not already assigned; likely to be SPI champion).

- Develop SEPG charter.

- Start team building for the SEPG.

1.6.3   Maintain Visibility

Purpose   The purpose of maintaining visibility of a SPI program is to

- Keep senior management attention focused on the long-term program.

- Provide information to the organization as a whole to see the effort and progress of the SPI program.

- Provide ongoing recognition of what is happening within the SPI program as it evolves.

SPI programs are launched and sponsored by executive management, but they are often forgotten or become invisible after the initial fanfare is over. Having a regular time set aside at all levels of management for paying attention to the SPI program keeps the program in focus and maintains its visibility. This will enable management to respond to situations that arise at individual sites before these situations approach crisis proportions. Successes can be shared, and a common vision and approach to the SPI program can be developed across the entire organization.

Maintaining visibility of the SPI program and its activities is crucial to the survival of the program. During the early part of the program, the SPI program does not provide highly visible results. There is a tendency to lose sight of the objectives and long-term nature of the SPI program, especially during periods of organizational upheaval and crisis. Quite often SPI programs die through neglect rather than deliberate termination, as individuals become more concerned and involved with day-to-day crises and lose focus on the long-term benefits.

This activity is initiated once the organization has decided to undertake a SPI program. The activity will remain active for the duration of the SPI program. In the early stages of the SPI program, this activity consists in building an awareness and generating support for the undertaking. While the improvement program is under way this

activity serves to continuously reinforce the benefits of the SPI program.

Objectives
- Keep all levels of management informed on the issues, progress, and results of the SPI program.

- Keep the entire organization informed on the progress and results of the SPI program.

- Publicly recognize efforts of individuals and teams in the SPI program.

Entry Criteria
- SPI program under way

Tasks
- Conduct management briefings and reviews.

- Establish organization-wide communication vehicles (such as newsletters, town-hall type meetings, brown bag seminars) to keep the entire organization informed on the progress and results of the SPI program.

- Establish a recognition program that publicly demonstrates rewards for SPI efforts and results.

Validation
- Survey the organization to determine the effectiveness of communications.

Exit Criteria
The program must maintain visibility of its efforts throughout its lifetime. There is no exit from communicating progress and results unless the entire program is terminated.

Specific messages must be effectively communicated. The organization should be periodically surveyed to ensure that the messages are being received.

1.6.4   Facilitate and Encourage Information Sharing

Purpose

The busier SPI programs get, the less time there is to share information between the SEPG and the rest of the organization, especially those not directly involved in a SPI program, and between other SEPGs in the organization. Sometimes these organizations are solving some of the same or related problems, or breaking the same ground on how to become more effective in their SPI work. More formal mechanisms to facilitate and encourage information sharing can help.

The purpose of such mechanisms is simply to cause information to be shared in a regular, structured fashion so that such exchanges do not get lost in the day-to-day business of the SPI program.

There are two main dimensions; local (site information sharing) and global (information sharing between organizations). Local information is shared through a variety of means such as monthly newsletters, brown bag lunches, attendance by the SEPG at various staff meetings, etc. Global information is shared by holding periodic meetings (at least quarterly) where the SEPGs from different organizations are brought together, preferably away from their work environments, with a structured agenda to share lessons learned, problems encountered, and successes. Where several SEPGs are close to each other geographically, local **software process improvement networks (SPINs)** may be a vehicle for information sharing. These usually meet monthly.

Objectives

• Establish periodic, planned SPI program meetings to share information locally about effective practices and learn from others' efforts.

• Establish periodic, planned cross-organizational meetings of SEPGs to share information globally about effective practices and progress, and to learn from other organizations.

Entry Criteria

• SPI program under way.

- For multi-organizational sharing, more than one organization must have a SPI program under way.

Tasks
- The local SEPG sets up periodic (perhaps quarterly) meetings that the key participants in the SPI program—MSG members, TWG leaders, process owners and architects, and pilot project leaders—attend.

- A corporate SEPG sets up periodic (perhaps annual) meetings to bring the various local SEPGs together.

- Incentives and recognition are provided for participating in local and global meetings.

Validation
- Survey meeting participants for effectiveness of presentations, sharing, and practices.

- Track long-term usage of practices to see how widely they are adopted.

Exit Criteria   As long as the SPI programs are running in organizations, information should be shared among the various participants.

Meetings should occur at frequent enough intervals that practices can be shared before they are reinvented.

1.6.5   Retain Lessons Learned and Improvements Developed

Purpose

While the information-sharing activities described previously facilitate sharing of lessons learned, successes, and typical problems and their resolution, they only do so for the immediate time frame. As SEPGs evolve and personnel rotate, these lessons become lost and forgotten, and the SEPGs find themselves "reinventing the wheel" when they run into the same or similar problem later.

The SPI program must establish or integrate with an existing long-term memory capability to facilitate the organization's continued growth and maturity. To achieve this, creation of a repository or process database is vital. This is a mechanism where lessons learned, successes, and examples of the artifacts coming out of SPI programs are maintained and distributed. Information should be regularly captured on such things as

- The process for SPI.

- Processes and products produced.

- Examples of artifacts generated during a SPI program (for example, action plans).

- Solutions developed and how they were applied.

In addition to being used to collect information, the samples collected should be transformed into generic templates, and the lessons learned folded into some continuously updated approach that is disseminated to all SPI participants. This kind of activity can be done within the SEPG on a local basis, or may require some focused corporate resources to be effective. For most effective corporate-wide learning, all sites should contribute to and draw from the collective repository. In the absence of a corporate-wide effort, local SEPGs could still perform this function for their organizations.

Objectives
- Establish criteria and processes for information gathering and retention.
- Collect and disseminate lessons learned.
- Develop generic, reusable components of SPI program.

Entry Criteria
- SPI program under way.
- Local SEPG established.
- SPI program has information to share.

Tasks
- Establish criteria for information to retain.
- Establish processes for collecting, cataloging, and disseminating information.
- Create SPI repository
- Collect and catalog process information and lessons learned.
- Periodically publish index of materials in repository.
- Derive generic components (templates, tools, methods, etc.) for reuse by other SPI programs.
- Disseminate lessons learned and generic components to all SPI participants.
- Publicize use of repository items by using success stories, recognition programs, etc.

Validation
- Track usage of components, requests for types of information, inflow and outflow of information, and other measures that indicate effectiveness of the repository.
- Ultimately, assess whether the repository gets used, stays current, and becomes part of the standard operating environment of the organization.

Exit Criteria

The collection and dissemination of information about SPI must continue as long as the organization wants to continue to learn from and improve on its past efforts and not lose organizational memory.

1.6.6   **Provide a Support Network**

Purpose   For most organizations, SPI is a new activity; thus new knowledge, skills, and behaviors must be learned and some old ways of doing things stopped. This requires personal as well as organizational change, and the people involved need support to keep making progress in learning new ways of doing things.

With an informal, peer-to-peer support network established, SEPGs and other SPI participants can go directly to their peers in other organizations or at other sites to get advice and support. They can find qualified, experienced people to help fill the gaps where they might not have sufficient resources to do something. They can call on their peers to get advice and try out their ideas.

To make this effective, they have to know their peers and trust them. They may start to build a "super" team consisting of SEPGs across all sites, establishing an informal network of SPI programs. This cannot be accomplished just through information-sharing mechanisms. Deliberate team building activities should be planned and coordinated. Some mechanisms that have been used effectively are

- Common training.

- Collaboration on assessments.

- Joint process improvement projects across the organization.

With a corporate SPI infrastructure, there are opportunities for economies of scale that are not available in a single-site activity. If a majority of the members of a single site SEPG leave for some reason, usually the group must go outside for new training and orientation. The group may even have to back up several steps and start again with all the facilitation and support provided at their start-up. This can become very expensive over a large number of sites, especially in an environment in which people regularly rotate assignments, or in which staff downsizing is occurring. Furthermore, SEPG members at a single site have to translate all advice from their

facilitators and teachers to their context and have to keep calling on that initial start-up support organization for assistance and advice.

Objectives
- Establish a broad, informal, company-wide network of SEPGs.

- Establish programs and mechanisms for SEPGs to work together.

Tasks
- Provide common training for all SEPGs.

- Plan supporting activities between SEPGs (such as collaboration on assessments and joint, cross-organizational improvement projects).

- Create a directory of SEPG members across the company and their specific areas of expertise.

Validation
- Local SEPG members know where to get help outside their organizations.

- SEPG members spend some amount of time outside their home organizations helping other SEPGs.

Exit Criteria
This activity must continue as long as the various SEPG members across the company need support, which is likely to be as long as their own program is running.

1.7   **Assess the Climate for SPI**

Purpose   The purpose of assessing the climate for SPI is to identify barriers and leverage points across the organization that will affect the SPI program, and to develop effective plans to ensure that the improvements made during the SPI program last.

A substantial portion of this task is based on concepts of managing technological change.

Objectives   • Identify key organizational barriers to a SPI program.

• Define strategies to interact with other related programs and initiatives.

• Define strategies to reduce those barriers.

• Develop a strategy and plan for developing sponsorship, communications, and change agent abilities.

Entry Criteria   • SEPG members have taken a course in Managing Technological Change (Table 1-2 on page 9).

• The infrastructure has been defined in terms of specific people, organizational entities, roles and responsibilities, and interfaces.

• The infrastructure is in place and operating.

Exit Criteria   • Assessments are complete.

• Sponsorship development plans and organization communication plan have been completed.

• Interfaces and interactions with other programs and initiatives have been defined.

• Change management strategy developed.

Outputs   • Change management assessment results and strategies.

• Organization communication plan and sponsorship development plans.

Tasks

- Assess the past history and barriers to implementing similar change programs.

- Assess the organization's culture and identify related barriers and leverage points.

- Assess sponsorship for SPI and determine what is needed to improve it.

- Assess current resistance to a new SPI program and identify related barriers and leverage points.

- Identify what other improvement activities and major developments are already occurring and determine how to interface and interact with them.

- Develop change management strategies to reduce or remove barriers, capitalize on leverage points, cascade sponsorship for SPI, manage target resistance to changes, and generally increase the organization's capacity for change.

- Develop an organization communication plan including messages, audiences, media, sequencing, and monitoring to implement the change management strategies.

1.8   Launch the Program

Purpose   The purpose of this activity is to move into the main part of the SPI program and start the continuous cycle of the process improvement program.

Usually this begins with an "SEPG kickoff" workshop that refreshes the memory of the MSG and SEPG members about what the road-map is and what kinds of things the SEPG and MSG will have to do in subsequent steps.

Objectives   •   Transition from initial activities to ongoing activities.

Entry Criteria   •   Program proposal approved.

•   Sponsorship and organization communication strategy and plans completed.

•   Interfaces and interactions with other programs and initiatives defined.

•   Infrastructure established in terms of specific people, organizational entities, roles and responsibilities, and interfaces.

Exit Criteria   •   Program and infrastructure in place and operating.

•   Agreement and approval to move to next step, 2.0, Manage the Software Process Improvement Program.

Tasks   •   Learn about the SPI techniques and process selected. (Conduct an "SEPG kickoff" workshop)

•   Review the SPI proposal.

•   Review organizational assessment results (from Step 1.7, Assess the Climate for SPI).

•   Review interaction plans for other programs and initiatives.

•   Obtain senior management approval to move to the next step, 2.0, Manage the Software Process Improvement Program.

2.0   Manage the Software Process Improvement Program

Overview   At the initiation of the SPI program, the initial SPI infrastructure was put in place to manage the activities that the organization would be undertaking during its SPI program. Now that some time has passed and the initial accomplishments of building support, obtaining sponsorship, gaining commitment, completing the maturity assessment, completing action planning, and defining baselines has been completed, it is a good time to review how well the infrastructure that was set up has performed.

Some questions to answer about the performance of the infrastructure that was initially put in place are

- Has the infrastructure effectively linked the SPI program to the organization's mission and vision?

- Has the infrastructure been able to obtain and allocate sufficient resources to ensure timely accomplishments?

- Has the infrastructure monitored the SPI program properly and provided guidance and correction as necessary?

As the organization moves from the initial baselining phase of the SPI program into the improvement implementation phase, it is critically important to have in place a strong, responsive, and supportive infrastructure. Any fine tuning or adjustments to the infrastructure should be made at this time, before beginning the next phase.

The improvement activities will not occur in a vacuum nor will they occur in a serial fashion. Once the SPI program is under way, there will be multiple improvement activities occurring across different organizational units. For example, there may be technical working groups (TWGs) addressing configuration management, requirements management, project planning, and peer reviews all active simultaneously. The infrastructure must keep track of all this and be

prepared to provide the required oversight and guidance to the efforts.

The supporting infrastructure must be aware that TWGs can and probably will operate in parallel. At any time, the improvement infrastructure must be prepared to

- Offer support for a technology being introduced.

- Coordinate training resources.

- Continue to build and provide sponsorship.

- Provide planning expertise.

- Assess organizational impact.

- Show lessons learned.

In short the infrastructure must perform many management functions for the organization as it progresses with the SPI program.

Tasks   The subtasks for Step 2.0, Manage the Software Process Improvement Program, are

Subtask	Page Number
2.1: Setting the Stage for Software Process Improvement	45
2.2: Organizing the SPI Program	48
2.3: Planning the SPI Program	55
2.4: Staffing the SPI Program	58
2.5: Monitoring the SPI Program	60
2.6: Directing the SPI Program	65

2.1   Setting the Stage for Software Process Improvement

Purpose

Once the SPI program is started, management has the most challenging and in some sense the most rewarding responsibility. Significant challenges will come from the organization's resistance to change, cost, and the schedule demands and inevitable slow progress that seem to characterize all improvement efforts. Management must keep the SPI program focused on improvements connected to the organization's vision and mission.

To keep the SPI program focused over the long term, a management infrastructure will be required. This management infrastructure will have to make changes of focus and adjustments to priorities many times as the effort proceeds. These changes will be driven by both internal and external factors, changes in the marketplace, shortage of resources, critical skill availability, availability of new or improved technologies, and any of a host of other factors.

One of the biggest challenges that the management infrastructure will have to deal with is the organization itself. The organization has a culture, and the SPI program in some cases will be asking this culture to change. Guiding an organization through a change in culture takes time.

A significant challenge related to dealing with the organization is management itself. Management must be able to recognize that they are a significant part of the organizational culture and that they may also be required to change as the organization changes.

Managers must be able to divorce themselves from cultural biases and organizational biases and be aware of the differing perspectives from different groups that make up the organization. They must work to integrate these different groups into the SPI program, building consensus and support for the SPI program as they proceed.

As the organization progresses through the SPI program, new or different technologies will be introduced to effect the improvements. A

problem will arise not from these new or different technologies, but from the fact that the organization itself will be required to go through a transition as these new or different technologies are introduced.

The difficulty in introducing a new technology lies not in the fact that the technology is new but in the fact that the technology will require change. Change is the culprit. As new or different technology is introduced during the SPI program, people will be asked to do their jobs differently, work with different equipment, work with different tools, or possibly change positions within the organization. People will be asked to move out of their comfort zone into something that is unknown to them.

It is a very common occurrence within an improvement effort to require people to change the way they currently do their work, and it is also a very common and natural thing for people to resist the change. Why should they change something that they have grown comfortable with for something that is unknown to them? The management infrastructure should be prepared for and expect resistance to the improvement initiative. Regardless of whether the improvements are viewed as a good thing or a bad thing, there will still be change and there will be resistance.

Being able to recognize that this resistance to the changes that management requires is occurring and being able to deal with it effectively is critical to the success of the SPI program.

The type and amount of resistance will vary from organization to organization, depending on the culture that exists within the organization.

Resistance will occur in two forms: overt and covert. It is easier for management to deal with the overt resistance, as it is out in the open and easily recognized. The harder challenge will be to surface covert resistance so that it is more recognizable and easier to deal with. Being aware that resistance will occur—that it is not always on the surface—and being able to recognize it when it is surfaced will make things go a lot smoother. However managing the SPI program will still be a difficult challenge.

Objectives   •   Establish priorities for the SPI program.

- Approve SPI strategic action plans.

- Allocate resources.

- Monitor improvement progress against plan.

- Develop reward system.

- Provide continuing, visible sponsorship.

Entry Criteria
- Commitment made to establish and implement a software process improvement (SPI) program.

- Proposal for SPI program completed and approved.

- Resources for SPI program authorized.

- Business needs identified.

Tasks
- Review and select baselines that are needed.

- Review resource requirements for the SPI program.

- Tailor roadmap activities as appropriate for the organization.

- Develop sponsorship activities.

- Introduce concepts of managing technological change and technology transition.

- Obtain training on ability to recognize and deal with obstacles that will present themselves to the improvement program.

2.2   Organizing the SPI Program

Purpose   As a SPI program gets under way, an infrastructure must be developed and put in place. This infrastructure will have the responsibility of providing guidance for the SPI program.

In most cases there will be three components to the organization's SPI infrastructure:

1. Software engineering process group (SEPG).

2. Management steering group (MSG).

3. Technical working group (TWG).

These are generic names and may vary from organization to organization. The components of the infrastructure and their relationship to each other are largely determined by such factors as organization size and geographical diversity. Figure 2-1 below is an illustration of the components of a typical SPI infrastructure**.**
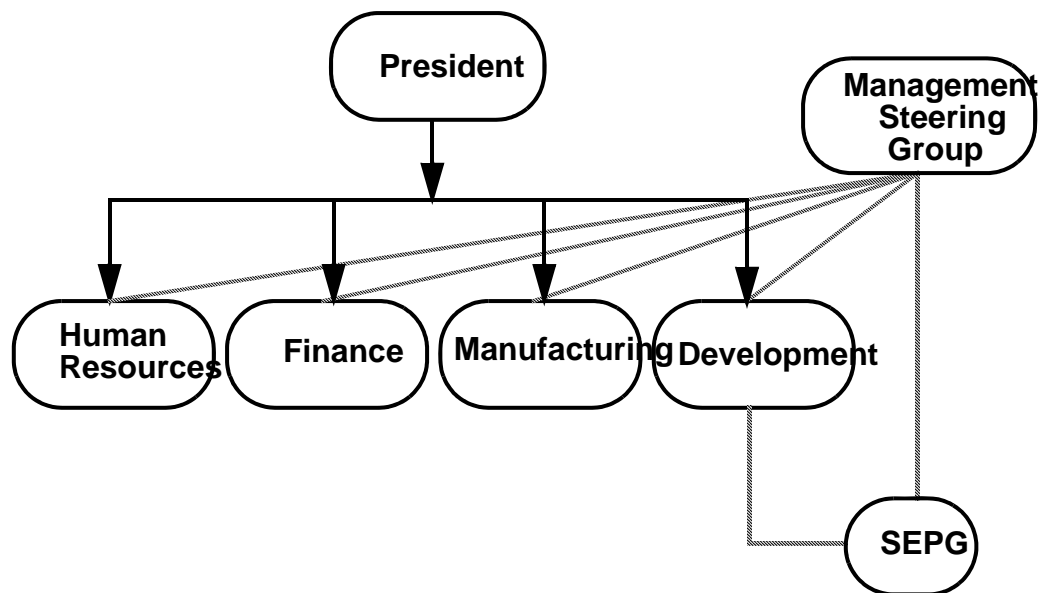
Figure 2-1: Components of a Typical SPI Infrastructure

First and most important is the **software engineering process group (SEPG)**, sometimes called the *process group*. The SEPG performs many functions for the organization in its SPI programs.

The SEPG

- Helps to sustain support for the SPI program in an environment of change.

- Builds and reinforces sponsorship.

- Nurtures and sustains the individual improvement activities.

- Ensures coordination of these activities throughout the organization.

The SEPG is chartered by the MSG. This charter acts as the contract between management and the SEPG. The charter typically outlines the role, responsibility, and authority of the SEPG.

It cannot be emphasized too strongly that the SEPG is *not* the implementor of the improvements. The role of the SEPG is that of a facilitator, helping to guide the process improvement activity. The SEPG also plays a support role, helping the projects with any difficulties that they may encounter as they implement process improvement.

In most cases members of the SEPG are recruited from the organization's existing staff of software engineering professionals. The support that the organization's management demonstrates for the SPI program will influence the ability to recruit quality people for membership in the SEPG.

Membership in the SEPG is on both a full-time and a part-time basis. Obviously, it is most desirable to have all members of the SEPG dedicated 100%, but this is not always achievable in practice. Part-time members can be used for periods of time when the SEPG has a lot of activity occurring for a finite period of time. It is strongly recommended that the organization have at least one person dedicated full time to the SEPG and that he or she be the SEPG leader.

Characteristics of a typical member of the SEPG include

- Experience as a practitioner.

- Expert knowledge in one or more domains.

- Good interpersonal skills.

- Respect of their peers in the organization.

It will be a difficult task to draw these people, who are some of the best and the brightest that the organization has, away from a project manager who has responsibility for a critical project.

Some staff will want to become members of the SEPG. The ease with which staff can be recruited will depend on the perceived level of management support for the SPI program. Projects may lose some of their best people to the SEPG. This must be allowed to happen, though. The organization should not sacrifice long-term gain for the organization as a whole in favor of short-term gain for an individual project.

In the long run, the organization must do all it can to ensure the success of the SPI program; yet this has to be balanced against the needs of the individual projects. The SEPG candidates must support the SPI program, be willing to act as champions for the SPI program, and be willing to serve as agents of change to the rest of the organization.

The leader of the SEPG must be a respected member of the organization with proven ability. The SEPG leader should also have the confidence of his or her peers and be looked on as someone who can get things done. The SEPG leader also must have the support and confidence of senior management.

In some instances organizations have written formal job descriptions describing the duties and responsibilities of an SEPG member. They then have posted the open positions for all to see and review, screened applications, and conducted a rigorous interview process in selection of the personnel to staff the SEPG. By doing the staffing in this manner, management sends a clear message to the organization about their view of the importance of the SPI program.

The SEPG will report on their activities to the second component of the infrastructure, the management steering group (MSG). Additional names for the MSG include *quality management board* and *process improvement steering committee*. The MSG is responsible for linking the SPI program to the organization's vision and mission.

Some of the duties of the MSG include

- Demonstrating sponsorship for the SPI program.

- Allocating resources for the improvement activities.

- Monitoring the progress of the SPI program.

- Providing guidance and correction to the improvement activities as necessary.

Membership of the MSG is made up of the senior manager as leader and selected members of his or her management team making up the rest of the group. This team makes up a standing committee, meeting regularly to address matters relative to the SPI program. The MSG usually meets monthly, but in the early stages of a SPI program it may meet more frequently to insure a proper start.

The third main component of the SPI infrastructure is the technical working groups (TWGs). Additional names for these groups include *process action teams* and *process improvement teams*.

These working groups are created to address a particular focus of the SPI program. For example, there could be a configuration management TWG or a project planning TWG addressing a specific software engineering domain. Also the TWGs do not necessarily have to address technical domains for improvement—they could address such things as travel reimbursement, software standardization, or purchasing, for example.

The TWG is typically made up of those practitioners in the organization who have knowledge and experience of the area under evaluation. Membership will also include those who would be affected by any improvement changes that would be implemented as a result of the investigation.

The TWGs typically have a finite life, the duration of which is usually defined in the charter. After the completion of the TWG objective, it is disbanded, and the members return to their normal duties.

During the early phases of the SPI program, issues of scope usually cause TWGs to underestimate the time required to complete their objectives. This results in TWGs going back to the MSG requesting more time or a reduced scope. Knowledge gained from TWG experience will reduce these occurrences as the scope of the working groups comes to be more specifically defined.

The TWGs report to the MSG. At the monthly meeting that the MSG holds, the agenda will always include a status briefing from each of the active TWGs. The TWGs also have a dotted line reporting relationship to the SEPG. This allows the SEPG to fulfill its charter of being the focal point for process improvement for the organization by keeping abreast of the improvement activities that are under way in the organization. This also allows the SEPG to create a repository of artifacts that have been produced and/or used during the improvement process. This repository, also called the **process database**, contains records of the data gathered and generated during the improvement process. This process database provides a ready reference for measuring results of the SPI program. It also provides a mechanism for familiarizing new personnel with the operation as they join the SPI program. Physically the process database will probably be a combination of artifacts in file drawers, multiple forms of data held in some machine readable form that belongs to the SEPG, and/or such things as electronic mail messages.

Objectives
- Establish infrastructure to guide and manage the SPI program.
- Create organizational awareness of the SPI.

Entry Criteria
- Commitment to establish and implement a SPI program.
- SPI strategic action plan in place, agreed upon, and approved.

Additional Components

In some instances benefit can be gained from having additional components to the SPI infrastructure. Typically these additional components are formed in organizational environments that are either very large and/or have wide geographical disbursement.

The first of these additional components is an executive council (EC). Members of the EC are made up of the senior management from each division. The EC provides broad guidance and interpretation of the organization's vision and mission and communicates this interpretation to the divisions. At the division level, it is the responsibility of the MSG for the division to ensure that the improvement activities in each division are responsive to the organization's vision and mission as provided by the EC.

The second additional component is usually called something similar to **software process improvement advisory committee (SPIAC)**. This committee is usually created when an organization has multiple SEPGs resulting in multiple improvement efforts occurring across different locations within the organization. The reasons for having multiple SEPGs are typically a consequence of the organization's size and/or geographic disbursement of the organization.

The SPIAC serves as a forum where each of the multiple SEPGs are represented. Through this forum, sharing of experiences, lessons learned, and improvements accomplished will benefit the overall program. A forum in which SEPGs can exchange information reduces the number of false starts so that SEPGs do not have to duplicate work that other SEPGs have already done.

Figure 2-2 below illustrates how an improvement infrastructure might look in a very large organization.
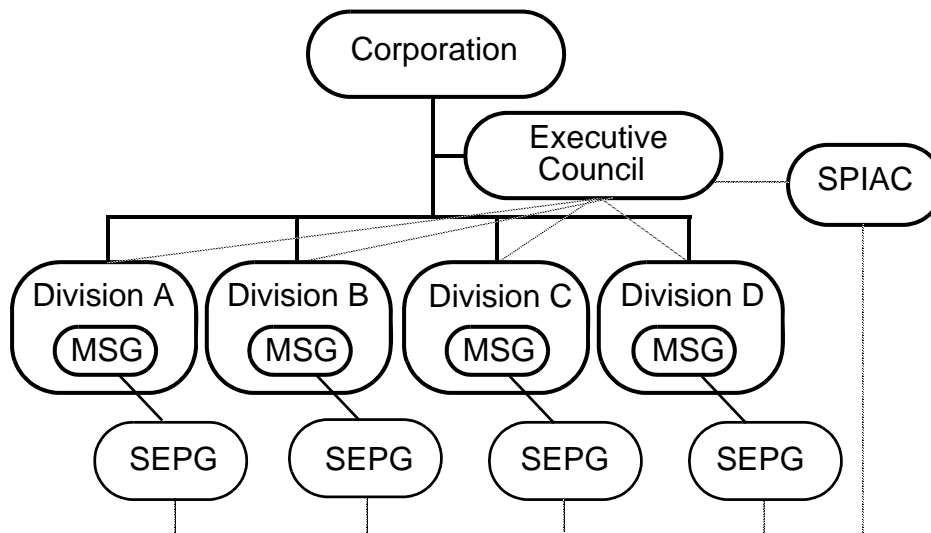
Figure 2-2: Typical SPI Infrastructure in a Large Organization

Tasks
- Establish the MSG.

- Establish the SEPG.

- Develop charter for the SEPG (MSG).

- Demonstrate sponsorship for the improvement activities.

- Develop charter template for the TWGs.

2.3   Planning the SPI Program

Purpose   Software process improvement will be a significant undertaking for
                          an organization. To coordinate the many activities that will occur in
                          the course of a SPI program requires an effective infrastructure for
                          support. Additionally, the infrastructure must be able to react in a
                          timely manner to the demands of the SPI program.

                          There are many plans that will be developed to guide and support the
                          SPI program. Strategic plans are the responsibility of management;
                          tactical plans to address specific improvement activities are the re-
                          sponsibility of the TWGs. There are also installation plans for pilot
                          adoption activity, and plans for rollout and installation of improved
                          processes on a broad scale. Each of these plans will have schedules
                          that must be monitored and defined milestones that must be re-
                          viewed. These schedules and milestones will be used to evaluate
                          progress toward a specific objective.

                          To decide on and introduce improvement, the current organizational
                          practices, used in creating the work product, must be researched and
                          evaluated so that they are fully understood and documented. Also to
                          be considered is what would be the impact of change in this partic-
                          ular area, trying to recognize potential impacts as early as possible
                          so they can be dealt with up front and in a timely fashion.

                          To help understand the current practices, techniques are available to
                          model and assess the current practice. This will define and document
                          the "as is" state. To determine the areas for improvement, the "as is"
                          candidate processes must be screened and evaluated. After this eval-
                          uation, information regarding the candidate improvement technolo-
                          gies should be gathered and shared so that informed decisions can be
                          made for selecting the candidate processes to improve and the can-
                          didate technology to be used for the improvement.

                          Developing the plans for the improvement activities starts with a re-
                          view of the findings and recommendations that resulted from the
                          software process maturity assessment. This input, along with input

from any organizational maturity, process, or metrics baselining activities that have been recently completed, provides the starting point for development of the SPI strategic action plan. These inputs along with the knowledge of and interpretation of the organization's vision and mission will help determine the content, priority, and sequence of activities for the SPI program.

One of the continuing activities of an improvement program is build and maintain sponsorship and support for the initiative. To help accomplish this objective, it would be beneficial to the program to find and fix a few quick-fix, quick-return improvement projects—picking the so-called "low-hanging fruit." Implementing these quick-fix improvements and communicating their occurrence will have many benefits. It will help demonstrate to personnel within the organization the value of the initiative by showing some immediate benefit. It will also help create enthusiasm and support for the initiative.

The SEPG works at both the tactical level and the strategic level within the SPI program, but it will probably concentrate most of its efforts at the tactical level, addressing issues that arise as the SPI program proceeds.

There will be many plans developed, modified, discarded, and completed as the SPI program proceeds, as business conditions change, and as personnel and organizational changes occur. The SPI strategic action plan, developed as a result of the maturity assessment and other baselining activities, will be the overall guide to the SPI program. Subordinate plans will include

- Plans for how the infrastructure will work.

- Plans and charters for the TWGs that will investigate and provide solutions within a specific problem area.

- Plans for pilot introduction of new or changed technologies.

- Plans for wide-scale introduction and initiation of piloted changes.

- Plans on how to adopt and institutionalize proven improvement accomplishments.

Appendix A.0, Taxonomy of Software Process Improvement Plans and Charters (page 145) lists and describes plans that are used in a SPI program. Appendix C.0, Charters and Templates (page 175) has

an assortment of sample plans, templates, and charters along with some discussion of their use and application.

Objectives
- Define goals of the SPI program.
- Provide focus and direction for the SPI activities.
- Determine resources required for the SPI program.
- Show commitment for the SPI program.

Entry Criteria
- MSG established.
- SEPG established.
- Organizational strategic business plan exists.

Tasks
- Review baselines and select which baselines to develop.
- Plan for and schedule training required for the selected baselines and strategic planning activities.
- Develop organizational plan for the SPI program.
- Develop SPI strategic action plan.
- Based on results from the baselining activities, develop tactical action plans.
- Develop detailed schedules through completion of baselining and strategic planning.
- Review and approve plans developed (MSG)

2.4   Staffing the SPI Program

Purpose   In most cases existing people resources will be used to staff the SPI
               program. These resources will include those that are allocated to the
               improvement work itself and those that are assigned to the SPI infra-
               structure to guide and manage the SPI program.

               In addition to the resources devoted to the management structure,
               additional resources allocated to the SPI program take two forms.

               The first are people resources that are allocated full time and make
               up the SEPG. Staff to fill the positions in the SEPG will usually
               come from the practicing professionals within the organization's de-
               velopment ranks. The success of the SEPG and the effectiveness of
               the SPI program depend largely on the quality of the people that staff
               the SEPG.

               The SEPG is a small organization; typically it has a staff size that is
               equal to 1% to 3% of the organization's practitioner head count. Oc-
               casionally, extra resources will be needed for some specific tasks.
               To provide these additional resources for the SEPG when required,
               there may be some temporary members assigned to the SEPG. These
               assignments are usually for a finite period of time, allowing the
               members enough time to complete their specific task before return-
               ing to their previous duties.

               A second set of resources will be required to staff the TWGs that will
               be formed to address specific improvement issues. Resources for the
               TWGs are usually committed as a percent of a full-time person; for
               example, "John, we would like you to spend 20% of your time for
               the next 8 months working on the TWG that is solving our require-
               ments management problem." These resources are committed for a
               finite length of time, usually defined in the TWG charter, and are as-
               signed very specific responsibilities within the SPI program by the
               MSG.

               A TWG will be formed by the MSG, given its specific charter and
               goals. When its tasks are completed, the TWG will be disbanded.

There are some instances in which a TWG is active continuously, usually addressing broader issues and consuming a smaller percentage of members' time.

Typically TWG membership will rotate among the staff. This will allow the organization to provide fresh insight into the problem-solving process and also allow more personnel to become further exposed to and become a part of the SPI program.

The last component of the SPI infrastructure that will need resources assigned to it is the MSG.

For the most part, resources assigned to the MSG come from the organization's existing management structure, although it is not unheard of to have input from the customer community.

In most cases each major component of the organization is represented on the MSG by at least one member, and leadership of the MSG is provided by the senior executive. Additionally the SEPG is typically represented on the MSG by the SEPG leader, usually in a non-voting capacity.

Objectives
- Assign management-level staff to the MSG.
- Recruit qualified staff for SEPG membership.
- Recruit and/or assign proper representation to TWGs.

Entry Criteria
- MSG established.
- SEPG established.

Tasks
- Assign management staff to the MSG.
- Create job descriptions for the SEPG members.
- Recruit staff for the SEPG.
- Develop guidelines for TWG membership.
- Recruit and/or assign staff to the TWGs.
- Review resource requirements for each baselining activity against resources available.

2.5   Monitoring the SPI Program

Purpose   As the SPI program proceeds, one of the responsibilities of the MSG
will be to periodically review progress of the initiative against the
milestones and goals that are defined and documented in the SPI
strategic action plan. These progress reviews of the SPI program will
be regularly scheduled, and occur at the monthly meeting of the
MSG.

The format that the reviews will take should be defined in advance
by the MSG, documented in the TWG charter and should be the
same from review to review. It may take a few cycles of review
meetings to determine the most productive format for the review and
any associated artifacts that are used or distributed at the review.

Evaluation activities encompass all facets of an organization's SPI
program. Evaluations ask such questions as

·   Are we doing it right?

·   Are we doing the right thing?

·   Have we achieved the expected benefits?

·   Are the improvement projects on schedule?

To monitor the SPI program, a measurement system to evaluate
progress must be in place. The key to evaluating the SPI program
will be the metrics that are selected for measurement and the ease
with which they can be gathered. Measurement will occur at many
levels throughout the organization—from very low-level measure-
ments such as coding errors that are found during inspections or test-
ing to higher level measures such as the rate and/or volume of field
trouble calls. All these measures should be maintained so that a his-
tory of the benefits of the SPI program will be available when need-
ed.

There are generally two forms of evaluation of the SPI program.

1. Micro-level evaluation, whose parameters are defined during the baselining and planning activities. This micro-level evaluation deals with such things as project schedules, milestones, process performance, process quality, and other quantitative measures.

2. Macro-level evaluation, which deals with broader, more qualitative issues such as business issues, business value, competitive factors, market conditions, etc.

Objectives   Ensure that

- Improvement activity is consistent with corporate objectives.

- Plans for the SPI program are being followed.

- Progress toward improvement goals is being made.

Entry Criteria   • TWGs are defined and operational.

- Working group plans have been developed and approved.

Micro-Evaluation   The infrastructure evaluates the SPI program at the micro level by measuring progress of the SPI program quantitatively. This evaluation includes the existing process and technologies and also the expectations from new or different processes and technologies not yet in use by the organization but being considered for adoption.

Process performance also should be evaluated. The effectiveness of old and/or existing processes should have some type of metric that can easily be applied to determine whether or not these processes are contributing to the overall mission of the organization. Processes should also be measured to enable comparison of current performance to new performance when new or improved processes are implemented. Once new processes are implemented, they should be continuously monitored and their performance evaluated to ensure that the benefits expected from their introduction are being achieved.

Quality performance of the processes is also evaluated at the micro level. During the baselining process and during the development of plans for new or revised processes, quality expectations and quality metrics are defined and implemented within the processes to verify their benefits. Later, as the processes are implemented, a longer range comparison of expected or planned results can be made.

The monitoring, evaluating, and reporting on process quality and effectiveness is typically the responsibility of the software quality assurance group. The SEPG will play a supporting role in this effort. The SEPG will not be the only group assisting in this effort. Project staff will also provide input regarding quality and effectiveness of processes used in the development activity.

Working groups will provide input about expectations for new processes being introduced and the quality and effectiveness of existing processes that they are investigating.

At the micro level of evaluation, members of the SEPG, quality assurance personnel, the TWGs, and the project staff are responsible for evaluating the performance of the process and recommending and applying control mechanisms to achieve the expected results.

Macro-Evaluation   Evaluations of the SPI program at the macro level tend to be more qualitative and are therefore the responsibility of the MSG.

When they design the new processes, the SEPGs, TWGs, and projects must consider the criteria that management needs to make these more qualitative evaluations at the macro level. Management will also consider criteria that is input from other sources such as market information, competitive information, vision and mission interpretations, and input from the general business environment.

Monitoring the SPI program and applying proper control procedures will ensure that the goals and objectives of the program are being met. It will also ensure that the program is consistent with corporate strategies. Each component of the infrastructure must periodically review its own progress and also review the progress of its subordinate organizations.

Individual improvement efforts are evaluated in the review meetings that have been defined and documented in the schedules.

Periodically reviewing the progress of the improvement program enables detection of early warning signals that can indicate that the program is off track. Two key questions should be asked at each of the program reviews:

1. Are we meeting the milestones set for this individual program?

2. Are the programs consistent with the strategic direction of the corporation?

The format that the reviews will take should be defined in advance by the MSG and should be the same from review to review.

The plans that are developed to guide the improvement activities will include a schedule of milestones, scheduled review meetings, and defined deliverables. The regularly scheduled in-process reviews will compare progress against the previously agreed-upon schedules. In this manner the MSG will be able to get early warning of any difficulty occurring within the SPI program and be able to provide corrective action.

After evaluating available technology and selecting a technology to use for improvement, an approach for introducing the selected technology must be formalized. This includes obtaining sponsorship, planning the implementation, evaluating risk, and selling the new technology to pilot users. After selecting the pilot and testing the technology and approach to implementation with the pilot, the results are evaluated. This evaluation answers these questions:

- Did the new technology improve the process it was selected to improve?

- Are there any downstream impacts that were not planned for?

- What lessons were learned in the pilot that can be applied so that implementation has minimal impact?

From the lessons learned with the pilot, the implementation approach is revised for wide-scale adoption. The revised plan from the pilot is used to introduce the technology on a broader scale across the organization.

During the time that the implementation has been occurring across the organization, a support mechanism for the new technology must be established. Also at this time, lessons learned during the adoption and institutionalization process should be documented and analyzed. These are retained in the process database for use in future adoption and institutionalization activities.

From time to time, course correction or change of focus of the SPI program may be necessary, for such reasons as business opportuni-

ty, organizational or personnel changes, funding issues, and others. This is not unusual and should not be cause for dismay. By having scheduled, periodic reviews of the activities of the SPI program, the MSG will be able to provide the necessary guidance and be able to make informed decisions regarding the overall effort at the earliest opportunity.

Tasks

- Define procedures for SPI status/progress reviews.

- Develop schedule for SPI status/progress reporting meetings.

- Review progress against SPI strategic action plan.

- Review process performance against plan.

- Review strategic direction.

2.6   Directing the SPI Program

Purpose   The SPI program needs direction on two levels—strategic and tacti-
                      cal. The strategic-level direction insures that the overall goals of the
                      organization will be met. The tactical-level direction insures that
                      specific improvement activity, consistent with the strategic goals, is
                      accomplished. The MSG is charged with providing this direction to
                      the effort.

                      At the strategic level, the MSG must ensure that the SPI efforts are
                      linked to the organization's overall vision and mission. Working at
                      this strategic level, the MSG is concerned with a broad set of issues
                      that can affect the SPI program. Some additional areas for review
                      and evaluation include market opportunities, organizational struc-
                      ture, technology advances, available resources, etc.

                      Some of the responsibilities include

                      •   Reviewing and linking together the existing policies of the
                          organization.

                      •   Evaluating how these existing policies help or hinder the SPI
                          program and how they integrate with the overall vision and
                          mission.

                      The MSG must tie all this together. Integrating all of this with the
                      findings from the assessment and baselining efforts is a critical step
                      in determining the priorities of the SPI program.

                      Direction at the tactical level is focused on getting the proven im-
                      provement activities completed and institutionalized. The MSG
                      must resolve any and all impediments discovered during the evalu-
                      ation of existing organization policy and procedures. After evaluat-
                      ing existing and planned baselines, the MSG will also determine and
                      set priorities for the activities that will address the findings from the
                      assessment and baselining.

                      TWGs must be chartered to address specific areas that have been
                      previously agreed upon and prioritized by the MSG. The charters
                      that will be developed must be drafted so that the schedule, mile-

stones, and resources are understood by all members of the TWG. Additionally the progress reporting requirements should be defined and scheduled for the duration of the TWG.

Directing the activities of the SPI program will not be as easy as it appears. For example, there can be minor changes made in a specific department that do not appear to have much impact. But, a different department might use the work product of the department that made the change, and might rely on things being done the old way to get its job done properly. Consideration must be given to the way in which changes in one area, no matter how minor, can have a ripple effect on the entire organization.

Such events can be prevented by making sure that the proper people are represented on the TWGs and that changes are piloted in a controlled setting before being released across the organization.The working group should include users of the process, suppliers to the process, and receivers of the finished product. By itself this will not ensure that the problem will be solved, but it will significantly reduce its chance of occurring.

Objectives
Ensure that SPI program direction is consistent with the organization's vision and mission.

Tasks
- Review existing policies and procedures.

- Evaluate existing policies and procedures to determine priorities for establishing TWGs.

- Authorize and initiate TWGs as required.

- Evaluate criteria and make informed decisions regarding priority and direction of SPI program.

3.0   Build Software Process Improvement Strategy

Overview

This step is one of the most critical in the roadmap—and most often neglected. This is where the management team develops or updates a software process improvement (SPI) strategic action plan, based on the organization's vision, strategic business plan, and past improvement efforts. This is a step that is repeated as needed. Usually it is triggered by a lack of a strategic improvement plan for an organization on its first cycle through this roadmap. For those organizations on a subsequent cycle, this step can be triggered by a need to update the previous plan, goals, or directions.

This process is the responsibility of the management steering group (MSG). In a sense, this is the creation of a "management" baseline, similar to the more process-oriented or technical baselines developed in Chapter 4.0, Baseline Current State (page 99). There is a strong tendency to delegate this step to the software engineering process group (SEPG). Experience has shown, however, that this usually does not work. Line managers must demonstrate their active sponsorship by taking the time to be actively involved in developing this plan, owning it, and committing to it. Just as the practitioners and middle managers develop ownership of the technical baselines and issues identified through their involvement, so must the senior management develop ownership and consensus on the directions to be taken and how to get there. Without a solid strategy to guide the SPI program, it will have a tendency to "drift" with the problems and priorities of the month (or day in some cases), causing the initiative to degenerate into not much more than another fire-fighting activity.

The MSG begins by determining what kind of strategic planning process it will follow. Most organizations have their favorite approach to strategic planning. Regardless of the specific method used, the important thing is to develop a solid plan. The MSG then reviews

the organization's vision, strategic business plan, past improvement performance, and current key business issues in order to determine how the SPI program fits. It then considers the results of baseline activities and incorporates these results into the SPI strategic action plan. The MSG also integrates the SPI strategic action plan with the organization's vision and strategic business plan, making modifications and revisions as necessary.

The SPI strategic action plan will be based on the results of the baselining efforts, the organization improvement goals, and the resources available. It should provide guidance for the overall SPI program and address how the long-range organization goals will be reached. It is important that the process improvements are driven by business reasons, as opposed to process improvement for its own sake. Even though the implementation of process improvement will usually have a heavy staff component, this cannot turn into a staff activity.

There is a strong temptation at this point to immediately begin making changes. However, the history of these kinds of improvement efforts has shown that without careful planning, the efforts will eventually falter, get sidetracked, or will not meet the unwritten expectations of senior management. The reason for the plans is not just to identify the improvement, but to meet the organization's critical business needs by installing those improvements across the organization. Identification is often the easiest part. Getting everyone throughout the organization to change the way they do things is always the most difficult part of any improvement effort.

Purpose   The purpose of this step is to develop or refine the SPI strategic ac-
                     tion plan to provide guidance and direction to the SPI program in the
                     years to come. The SPI strategic action plan is critical in that it is
                     needed to provide clear guidance to the various process improve-
                     ment actions that will be taken over the next few years. It should pro-
                     vide clear business reasons for conducting the SPI program and
                     should be clearly and measurably linked to the organization's strate-
                     gic business plan and vision.

                     The primary output of this step is the SPI strategic action plan. Sec-
                     ondary outputs may be revisions to the organization's vision and
                     strategic business plan.

Objectives   The objectives are to

                     •   Develop/update a long-term (three- to five-year) SPI strategic
                         action plan that encompasses the entire organization's software
                         process improvement activities and integrates them with any
                         other total quality management (TQM) initiatives already
                         planned or in process.

                     •   Develop/update long-range (three- to five-year) and short-term
                         (one-year) measurable goals for the organization's SPI
                         programs.

                     •   Integrate the SPI strategic action plan with the organization's
                         strategic business plan, mission, and vision.

                     •   Integrate the baseline findings and recommendations into the
                         SPI strategic action plan.

Education/Training The primary training required for this step is training on a strategic
                     planning approach for the MSG and the SEPG. Organizations that
                     do not have a satisfactory vision and strategic business plan may
                     want to get training and support in vision development and strategic
                     business planning.

Commitment   This step requires a substantial commitment from senior manage-
                        ment, primarily of their own time to work on developing the SPI
                        strategic action plan. Senior managers must commit to leading the
                        SPI program by demonstrating to everyone that even they are will-
                        ing to take the time to develop a good plan for their team's activities
                        (a tactical plan for developing the strategic plan) and then to follow
                        it. In the process, senior management should learn and use the same
                        methods and techniques that the process action teams will have to
                        learn. Demonstrating visible sponsorship in this way can go a long
                        way toward convincing people that management is serious about
                        software process improvement.

Communication   The MSG will be communicating with other (non-software) senior
                        management in developing objectives and goals. The baseline teams
                        will be reporting issues, results, and recommendations, which will
                        support and be incorporated into the SPI strategic action plan.

                        Good goals are few in number, critical to the organization, highly
                        visible, and built with consensus—both horizontally and vertically.
                        To build good goals will require a substantial amount of bidirection-
                        al communication between different management groups and be-
                        tween management and practitioners.

Entry Criteria   • A SPI implementation plan is complete and approved.

                        • The SPI infrastructure, particularly the MSG, is in place and
                          operating.

                        • The MSG has decided that the SPI strategic action plan needs to
                          be updated.

Exit Criteria   • The SPI strategic action plan is complete and approved.

                        • The organization's vision, strategic business plan, and SPI
                          strategic action plan are synergistic.

Tasks   See Figure 3-1 on page 74 for a pictorial representation of the tasks.

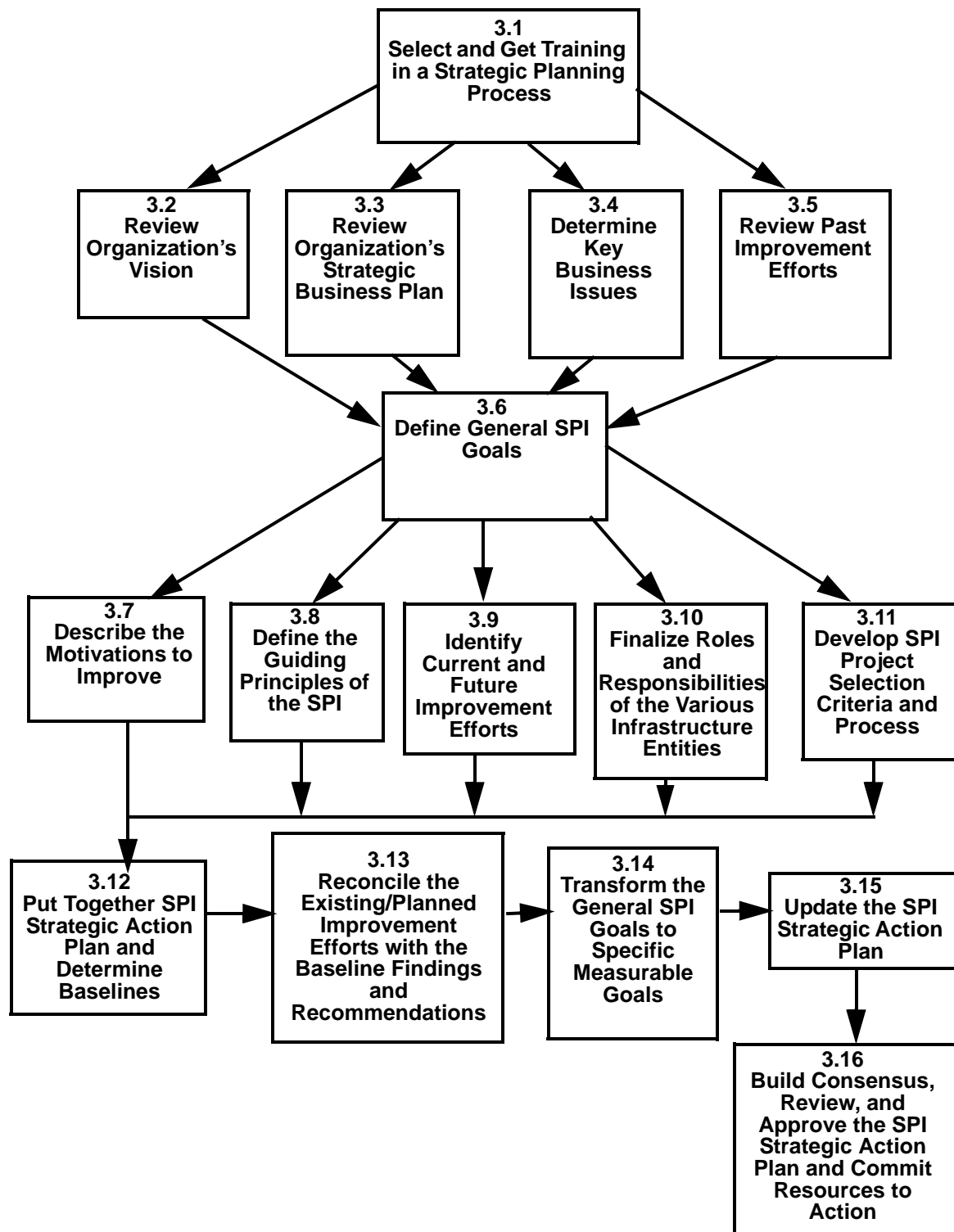3.0   Build Software Process Improvement Strategy

3.1
Select and Get Training
in a Strategic Planning
Process

3.2
Review
Organization's
Vision

3.3
Review
Organization's
Strategic
Business Plan

3.4
Determine
Key
Business
Issues

3.5
Review Past
Improvement
Efforts

3.6
Define General SPI
Goals

3.7
Describe the
Motivations to
Improve

3.8
Define the
Guiding
Principles of
the SPI

3.9
Identify
Current and
Future
Improvement
Efforts

3.10
Finalize Roles
and
Responsibilities
of the Various
Infrastructure
Entities

3.11
Develop SPI
Project
Selection
Criteria and
Process

3.12
Put Together SPI
Strategic Action
Plan and
Determine
Baselines

3.13
Reconcile the
Existing/Planned
Improvement
Efforts with the
Baseline Findings
and
Recommendations

3.14
Transform the
General SPI
Goals to
Specific
Measurable
Goals

3.15
Update the SPI
Strategic Action
Plan

3.16
Build Consensus,
Review, and
Approve the SPI
Strategic Action
Plan and Commit
Resources to
Action

Figure 3-1: Process for Building SPI Strategy

The subtasks for Step 3.0, Build Software Process Improvement Strategy, are

3.1   Select and Get Training in a Strategic Planning Process

Purpose   The purpose of this activity is to choose a consistent approach to strategic planning for the SPI program and to develop skills in building a solid strategic planning foundation upon which to sustain the SPI program.

Objectives   •   Select a strategic planning process.

                     •   Train the MSG and SEPG in the process and methods.

Entry Criteria   The SPI infrastructure, particularly the MSG, is in place and operating and has started a strategic planning effort.

Exit Criteria   The MSG and SEPG have completed training in the process.

Tasks   •   Review strategic planning methods already in use.

                     •   Review strategic planning needs for the SPI program.

                     •   Select a strategic planning process and approach.

                     •   Contract for, schedule, and hold strategic planning training.

3.2   Review Organization's Vision

Purpose   The purpose of this activity is to clearly link the SPI strategy to the organization's vision and directions so that guidance to the SPI program can be consistent with guidance to other activities within the organization.

This activity may repeat some of the work done in Step 1.0, Initiate Software Process Improvement (page 7). Sometimes this repetition is not needed, but often, the MSG has different members than those who initiated the SPI program, and they will need to cover some of the same topics to develop their own understanding and strategy. When this step is entered as a result of a subsequent cycle through the improvement roadmap, these topics should be reviewed at a minimum.

Objectives
- Review and possibly modify current vision.
- Generate new vision if one does not exist or if the existing one is not adequate.
- Identify goals and motivations for the SPI program.

Entry Criteria   The MSG and the SEPG have completed training in the strategic planning process.

Exit Criteria
- The SPI strategic goals that are driven by the vision are identified.
- The motivations for the SPI program that derive from the vision are identified.
- The vision and SPI strategy are synergistic.

Outputs
- Updated (possibly) vision statement.
- Identified motivations for improvement.
- Identified SPI strategic goals that are driven by the vision.

Tasks

- Review existing vision for adequate linkage to SPI program.

- Modify or generate new vision if current one is inadequate.

- Identify goals for the SPI program, based on the vision.

- Identify motivations for the SPI program based on the vision.

3.3   Review Organization's Strategic Business Plan

Purpose   The purpose of this activity is to clearly link the SPI strategy to the organization's strategic business plan so that guidance to the SPI program can be consistent with guidance to other activities within the organization. While not all process improvement activities can easily be linked to a business plan or goals, that does not mean that they are not needed. Some things must be done because they make the business run better, but they do not directly contribute to the bottom line.

This activity may repeat some of the work done in Step 1.0, Initiate Software Process Improvement (page 7). Sometimes this repetition is not needed, but often, the MSG has different members than those who set up the SPI program, and they will need to cover some of the same topics to develop their own understanding and strategy. When this step is entered as a result of a subsequent cycle through the improvement roadmap, these topics should be reviewed at a minimum.

Objectives   • Review and possibly modify current strategic business plan.

• Generate new strategic business plan if one does not exist or if the existing plan is not adequate.

• Identify goals and other (possibly competing) initiatives.

Entry Criteria   The MSG and SEPG have completed training in the strategic planning process.

Exit Criteria   • The SPI strategic goals that are driven by the strategic business plan are identified.

• Other improvement efforts that complement or compete with the SPI program are identified.

• The strategic business plan and SPI strategic action plan are synergistic.

Outputs   • Updated (possibly) strategic business plan.

- Identified SPI strategic goals, driven by the strategic business plan.

- Identified other improvement efforts that affect the SPI program.

Tasks
- Review existing strategic business plan for adequate linkage to SPI program.

- Modify or generate new strategic business plan if current one is inadequate.

- Identify strategic goals for the SPI program driven by the strategic business plan.

- Identify other initiatives that may support or compete with the SPI program and the degree of impact.

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3.4   Determine Key Business Issues

Purpose   Unless the SPI program is driven by the current business needs and understood and agreed to by management, it will likely be difficult to sustain the program over the long haul. This is because it will be difficult to clearly demonstrate to senior management that the initiative is achieving real value for the organization in business terms.

The key business needs have to be clearly defined, measurable, and understood to provide a common view to the SPI teams. Improvements should be selected based in part on their ability to satisfy these business needs. As described above, not all process improvement activities can easily be linked to current business issues; however the business issues identified should be used to prioritize SPI projects.

This activity may repeat some of the work done in Step 1.0, Initiate Software Process Improvement (page 7). Sometimes this repetition is not needed, but often, the MSG has different members than those who set up the SPI program, and they will need to cover some of the same topics to develop their own understanding and strategy. When this step is entered as a result of a subsequent cycle through the improvement roadmap, these topics should be reviewed at a minimum.

Objectives   Determine the key business issues driving the need for software process improvement.

Entry Criteria   The MSG and SEPG have completed training in the process.

Exit Criteria   •   The key business drivers have been clearly defined.

                     •   Criteria for prioritizing SPI projects have been developed.

Outputs   •   Defined and measurable business needs for SPI.

                     •   Prioritization criteria for project selection.

Tasks   •   Review the current short-term and long-term business issues as they affect SPI.

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- Develop prioritization criteria for selecting and launching SPI projects, based in part on the identified business issues.

3.5   Review Past Improvement Efforts

Purpose   People typically repeat past behaviors, including both those that lead to success and those that do not. The organization must learn from its past history and ensure that this initiative doesn't repeat past mistakes that may have caused similar initiatives to fail in the past.

The information collected in Step 1.7, Assess the Climate for SPI (page 40) is reviewed and analyzed, identifying past change or improvement projects and assessing how successful or unsuccessful they were and why.

Objectives   Review past change and/or improvement efforts and identify successful practices to leverage and unsuccessful practices to avoid.

Entry Criteria   The MSG and SEPG have completed training in the process.

Inputs   Assessment from Step 1.7, Assess the Climate for SPI.

Exit Criteria   Barriers and leverage points from past efforts are identified and strategies for reducing the barriers defined for this initiative.

Outputs   • Lessons learned from past efforts.

                      • Strategies for overcoming barriers.

Tasks   • Identify successful and unsuccessful change or improvement projects and determine what made them so.

                      • Complete necessary assessments from the Managing Technological Change course (if not already done in Step 1.7, Assess the Climate for SPI).

                      • Define strategies to deal with trends and barriers identified.

3.6   Define General SPI Goals

Purpose   Improvement is a long-term investment. Clearly defined, measurable goals are necessary to provide guidance and to assist in developing tactics for improvement. They also allow objective measurement of the improvement results.

Both long-term and short-term goals are necessary to focus the effort. The goals produced at this point tend to be general in nature until sufficient information is collected to quantify them. The quantification step is described in Step 3.12, Put Together SPI Strategic Action Plan and Determine Baselines Required (page 91).

Objectives   • Define long-term and short-term goals.

                     • Determine what measurements are needed to objectively measure the goal.

Entry Criteria   • SPI strategy can be clearly linked to the vision.

                     • SPI strategy can be clearly linked to the strategic business plan.

                     • The key business drivers have been clearly defined.

                     • Barriers and leverage points from past efforts are identified and strategies for reducing the barriers defined.

Inputs   • SPI strategic goals driven by the vision.

                     • Lessons learned from past improvement efforts.

                     • SPI strategic goals driven by the strategic business plan.

                     • Priorities and key near- and long-term business issues

Exit Criteria   • General SPI goals defined.

Outputs   • SPI strategic action plan "Goals" section.

Tasks   Break down and reconcile goals from vision, strategic business plan, key business issues, and past history of improvement efforts.

3.7   Describe the Motivations to Improve

Purpose People must understand why the organization is spending so much time and effort on a SPI program. They must be motivated to join in the effort and assist it.

The motivation should address the following points:

- Why change?

- What's wrong with the status quo?

- Why should I care?

- When will I be affected (immediately or sometime in the future)?

Typically successful motivations sell the pain of the status quo, as opposed to selling the promise of the desired state.

These motivations should be documented in the SPI strategic action plan.

Objectives Define motivations for SPI program.

Entry Criteria Motivations identified from the vision or similar sources.

Exit Criteria SPI strategic action plan "Motivations" section.

Outputs Defined motivations documented in "Motivations" section of the SPI strategic action plan.

Tasks
- Build list of motivations from the goals and problems identified in previous steps.

- Frame motivations in terms of the difference between the current state and the desired state.

- Document motivations in "Motivations" section of the SPI strategic action plan.

3.8   Define the Guiding Principles of the SPI

Purpose

The SPI program can be used as a model and a mechanism for ex-perimenting with different processes and behaviors that are desired. A typical guiding principle is to use the SPI program to experiment with revised management processes, such as new forms of planning, tracking, etc. New methods can "fail" on a SPI task with much less dramatic effect on the organization's customers. Failure in this sense means that the new process does not work as well or efficiently as initially expected—a common flaw of first-time pilots of a new or revised process.

Any such guiding principles should be documented for people to use as guidance in the SPI strategic action plan.

Objectives

Define guiding principles for SPI program.

Entry Criteria

Lessons learned from past efforts identified.

Exit Criteria

Guiding principles defined and documented in the "Guiding Princi-ples" section of the SPI strategic action plan.

Outputs

SPI strategic action plan "Guiding Principles" section.

Tasks

- Review other organizations' guiding principles for SPI.

- Select and define guiding principles for the SPI program.

- Document guiding principles in "Guiding Principles" section of the SPI strategic action plan.

3.9   Identify Current and Future Improvement Efforts

Purpose   Typically most organizations have many different improvement ef-
                     forts under way. Often these initiatives are un-coordinated and com-
                     pete with each other for scarce resources. If an organization is to
                     maximize the effectiveness of its investment in software process im-
                     provement, it must evaluate all of the initiatives under way and de-
                     termine how much it is investing in each one and in total. Resistance
                     to change is also directly correlated with the total amount of change
                     required of individuals. For an organization to get results, the cumu-
                     lative impact of all improvement efforts should not be overwhelm-
                     ing to anyone. Later, as the baseline activities start to produce find-
                     ings and recommendations, these new activities will have to be pri-
                     oritized against and reconciled with the existing and currently
                     planned initiatives.

Objectives   Identify all existing and/or anticipated improvement efforts in this
                     organization, either internally or externally driven (such as corpo-
                     rate initiatives).

Entry Criteria   Initiatives identified from a strategic business plan or similar sourc-
                     es.

Exit Criteria   Other initiatives identified, prioritized, and preferably reconciled,
                     with the result documented in the SPI strategic action plan.

Outputs   SPI strategic action plan, related initiatives identified in "Improve-
                     ment Agenda" section (see Appendix C.0, Charters and Templates,
                     page 175).

Tasks   •   Identify all existing and/or anticipated improvement efforts in
                         this organization, either internally or externally driven (such as
                         corporate initiatives).

                     •   Estimate resource investments in each and resources required to
                         complete, including deploying the improvement throughout the
                         organization.

·   Estimate the total amount of resources that the organization is able and willing to commit to these initiatives.

·   Prioritize the initiatives based on resource limitations and determine what areas the organization is willing to apply resources to and how many resources it is willing to apply.

·   Document the results in related initiatives identified in "Improvement Agenda" section of the SPI strategic action plan (see Appendix C.0, Charters and Templates, page 175).

3.10   Finalize Roles and Responsibilities of the Various Infrastructure Entities

Purpose   The purpose of this activity is to clearly establish the organizational methods/design for formally managing the SPI activities. It also establishes credibility with the rest of the organization that management is serious about this initiative.

This activity may repeat some of the work done in Step 1.0, Initiate Software Process Improvement (page 7). Sometimes this repetition is not needed, but often, the MSG has different members than those who set up the SPI program, and they will need to cover some of the same topics to develop their own understanding and strategy. When this step is entered as a result of a subsequent cycle through the improvement roadmap, these topics should be reviewed at a minimum.

Objectives
- Finalize roles and responsibilities for the SEPG, MSG, and any other SPI management and coordination groups.

- Define typical roles and responsibilities for technical working groups(TWGs) in terms of their responsibilities, authority, reporting requirements, etc.

Entry Criteria   Strategic planning activity launched.

Inputs   Draft infrastructure charters from Step 1.8, Launch the Program (page 42) or past strategic plan.

Exit Criteria   Roles and responsibilities defined and documented in the "Organization" section of the SPI strategic action plan.

Outputs   SPI strategic action plan "Organization" section.

Tasks
- Define roles and responsibilities for the MSG, SEPG, TWGs, etc. (or extract from their charter).

- Document roles and responsibilities in the "Organization" section of the SPI strategic action plan.

3.11   **Develop SPI Project Selection Criteria and Process**

Purpose   Publicly document an objective approach to deciding which of the many competing SPI recommendations and actions will be launched and funded. This procedure will be used whenever new ideas are added to the list of actions awaiting resources.

Objectives   Define criteria for selection of SPI projects.

Entry Criteria General purpose SPI goals defined.

Inputs   Prioritization criteria from review of key business issues or similar source.

Exit Criteria   Criteria for selection of SPI projects defined and documented in the SPI "Project Selection" section of the SPI strategic action plan.

Outputs   SPI strategic action plan "Project Selection" section.

Tasks   •   Define criteria to be used to select action items from a list and launch them.

                    •   Define a process to apply those criteria.

                    •   Define a process to add new actions and to remove outdated actions from the pending list.

                    •   Document the criteria in the "Project Selection" section of the SPI strategic action plan.

3.12   Put Together SPI Strategic Action Plan and Determine Baselines Required

Purpose

Once all the individual sections are ready, the SPI strategic action plan is ready to be put together. It is at this point that specific information needs will be identified that cannot be answered by simple review of other sources of information or by choosing among alternatives. Usually at this point there will be a need to form special teams to develop baselines of the current state of the organization in one or more dimensions. The most common form of baseline is to conduct a software process assessment (SPA), described in Appendix D.0, Establish Organization Process Maturity Baseline (page 193). Other forms of baselines include collecting metrics to support the strategic goals identified, documenting the current processes, and so on. Step 4.0, Baseline Current State (page 99) describes the baseline selection process in more detail.

Objectives

- Put together all sections completed to date of the SPI strategic action plan.

- Identify information required to define the organization's current state.

Entry Criteria

- Steps 3.1 through 3.11 completed.

Inputs

- General SPI goals.

- Finalized charters and roles /responsibilities defined for different groups.

- Project selection criteria and process.

- Competing/complimentary initiatives.

- SPI guiding principles.

- Motivations to improve.

Exit Criteria

The first draft of the plan is complete and the baselines needed have been identified.

Outputs
- SPI strategic action plan.
- Resources and charters for baselining groups.

Tasks
- Put together the SPI strategic action plan.
- Identify those areas needing further data gathering and analysis. Examples include SPAs, measurement data to support the goals, current process baselines.
- Prepare charters for each baseline team and allocate resources to that activity.

3.13 Reconcile the Existing/Planned Improvement Efforts with the Baseline Findings and Recommendations

Purpose

The baselines, particularly the maturity baseline, typically identify issues and provide recommendations based on a much broader consensus than may have been available before. These issues and recommendations serve to provide some guidance and often, a prioritization of actions.

The results of the baselines should be incorporated into the SPI strategic action plan and reconciled with all other existing and/or planned improvement efforts. This will result in one single strategy dealing with all software process improvement actions and all related improvement efforts affecting the same groups of people.

Objectives

• Incorporate baseline results into the SPI strategic action plan.

• Reconcile baseline results with all other existing and/or planned software improvement activities.

Entry Criteria

• Baseline results ready.

Inputs

• SPI strategic action plan.

• Baseline results and recommendations.

Exit Criteria

A single coherent strategy is defined, incorporating baseline results and other improvement efforts.

Outputs

• Composite action list.

• Matrix relating baseline recommendations and issues to other existing/planned activities.

• Reconciled plan.

Tasks

• Review the results of the baseline efforts.

- Build a matrix relating recommendations from the baselines to existing and planned activities.

- Review/revise goals as appropriate.

3.14   Transform the General SPI Goals to Specific Measurable Goals

Purpose   Now that the results of the baseline activities have been reconciled, sufficient data should be available to take the general long-term and short-term goals developed in Step 3.6, Define General SPI Goals (page 84), and make them specific. This is done by incorporating the measurement of the current state of those goals and defining an aggressive but achievable improvement in those measures.

For example, one general goal could have been to make software projects more predictable in terms of cost and schedule. The measurement baseline established that 80 percent of current projects exceed their original (bid) cost and schedule estimates by more than 25 percent. The revised goal could be to improve that measure such that 80 percent of all projects complete within 10 percent of their original estimates, (adjusted for changes of scope along the way) within 2 years.

The above is an example of how to transform a general business goal into a specific measurable process improvement goal.

Objectives   Transform all general goals into specific, measurable goals.

Entry Criteria   Measurement baseline complete

Inputs   •   Measurement baseline results and recommendations.

                     •   SPI strategic action plan ("General Goals" section).

Exit Criteria   Goals finalized

Outputs   Measurable goals

Tasks   •   Transform the goals into measurable specific improvement goals.

3.15   Update the SPI Strategic Action Plan

Purpose   Now that all sections of the SPI strategic action plan are ready, the
                     plan has been reconciled with the baseline results, and the goals
                     transformed, the plan has to be put together, edited, and finalized.

Objectives   Finalize the SPI strategic action plan.

Entry Criteria   All sections completed or inputs finalized.

Exit Criteria   Complete SPI strategic action plan written.

Outputs   Updated SPI strategic action plan.

Tasks   •   Merge the various sections developed during previous steps in
                         this process.

                     •   Edit, resolving inconsistencies, etc.

                     •   Prepare final draft for review.

3.16 Build Consensus, Review, and Approve the SPI Strategic Action Plan and Commit Resources to Action

Purpose   A strategic plan is no good if it is built in a vacuum and only a small
                     group believes in it. To be useful, it has to be "sold," and consensus
                     has to be developed.

Objectives   • Approve SPI strategic action plan.

                     • Build consensus and commitment to the plan.

Entry Criteria   Complete draft plan ready.

Exit Criteria   Plan finalized and signed off.

Outputs   Final, approved SPI strategic action plan.

Tasks   • Present/review the plan at all levels of the organization.

                     • Collect comments and suggestions and resolve conflicting ideas.

                     • Incorporate all changes and have all senior line managers as well
                       as the organization's senior manager sign the plan.

                     • Publicize the plan (send a copy to everyone in the organization).

3.0   Build Software Process Improvement Strategy

3.16   Build Consensus, Review, and Approve the SPI Strategic Action Plan and Commit Resources to Action

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4.0   **Baseline Current State**

Purpose   The baselines will describe how and how well the organization currently performs its software business. The knowledge of the strengths and opportunities for improvement is an essential prerequisite for identifying and prioritizing an effective and efficient SPI program.

The management steering group (MSG) must understand the organization's present state to develop a plan that will achieve the business changes specified in the organization strategic plan for SPI and the SPI strategic action plan. The baseline activities input this information into the SPI planning and prioritization process.

A recommended minimum set of baselines includes

- Organization process maturity baseline (software process appraisal or assessment). See Appendix D.0, Establish Organization Process Maturity Baseline (page 193).

- Process description baseline (initial software process map).

- Metrics baseline (initial level of business and process metrics to measure progress against).

For each baseline many effective methods of gathering information are available. For the process maturity baseline, a third-party contractor can do an evaluation with the **capability maturity model** (CMM) or their own proprietary maturity ratings, or the organization's own personnel can be trained to assess their process maturity. The MSG must choose the number and type of baselines that best achieve the objectives it has set and then create a baseline action plan for each.

Information about the current state of the organization flows to the MSG by means of the baseline findings and recommendations reports. Because the baseline reports will not necessarily coincide in time, information will flow irregularly. As information is available,

the MSG incorporates it into the improvement plans. Baselines do not determine the strategy, however. The strategy for improvement must be based on business goals and needs. The baselines can help determine the current state of the organization with respect to achieving those goals or being capable of achieving them.

Information on the current state will also be used by the technical working groups (TWGs) during Step 5.0, Develop Improvements (page 103) to develop process improvement solutions. Keeping the momentum of process improvement between baselining and deployment is very important.

Baselines are intended to be iterative; the major baselines conducted at this point provide a snapshot of the organization's various capabilities, processes, and measures. Subsequent cycles through the strategic portion of the roadmap will require repeated baselining to show what progress or changes have taken hold in the organization. Software maturity baselines should be repeated every eighteen months to three years. Metrics baselines should probably be taken more often, depending on the business cycle of the organization (if the organization goes through a full cycle only every two years, more frequent metrics baselines would probably not be useful. On the other hand, if the organization goes through a product cycle every three months, metrics baselines could be taken annually.)

Determining what to baseline and how to baseline is a decision that very much depends on the organization. Many software organizations will have certain types of baselines determined for them by what business they are in, such as Software Engineering Institute (SEI) software capability evaluations (SCEs) for government contracts, ISO 9000 certifications, Malcolm Baldridge evaluations, or internal company audits. Even in the face of "external" baselines, an organization should create its own baseline activities that can be properly tuned to meet the business and information goals of the organization.

Objectives   •   Understand the working of the current processes and the organizational interactions and how they contribute to the organization's business.

- Gather information on the current strengths and opportunities for improvement in the organization for input to the SPI planning process.

- Build involvement from the senior management team down to the staff for process improvement tasks that will make the work of the organization more effective.

- Detail the starting point for measuring improvement.

Education/Training   The SEPG and TWGs should have training in

- Change management.

- Team facilitation.

- Specific baselining methods [for example, SEI software process assessment (SPA), process modeling, interviewing].

Communication   Each of the baselining activities will have specific communication needs. In addition, getting the organization ready for baselining will require considerable communication, establishing dialogue between various levels and areas in the organization to maximize the effectiveness of the baselining teams.

Entry Criteria
- SPI infrastructure must exist.

- SPI implementation plan must exist.

- Organization strategic plan for SPI started.

Verification   The baselining activities must be self-verifying. The credibility of the baselines depends on their perceived ability to extract real, meaningful information from the organization and present it back to the organization in a coherent, actionable form.

Exit Criteria
- Baseline Findings and Recommendation Reports delivered to the MSG.

Tasks
- Determine the baseline information that is required and a strategy for collecting the information (complete part of the SPI implementation plan).

- Establish TWGs with charters (baseline action plans), schedules, and resources for each desired baseline.

- Perform various baseline assessments.

- Track TWG progress and redirect as necessary.

- Incorporate baseline reports (baseline findings and recommen-
dations report) and recommendations into SPI plans (SPI strate-
gic action and tactical action plans) during Step 3.0, Build Soft-
ware Process Improvement Strategy (page 69).

5.0   Develop Improvements

Overview   This step is the process in which technical working groups (TWGs) develop specific improvements to specific processes. There are two basic approaches to designing solutions:

1. Focus on solving specific problems.

2. Incrementally improve a particular process.

In the first approach, the TWGs focus on a specific problem and develop a solution using pilot projects to validate and refine the solution. In the second approach, the TWGs focus on a particular process and develop incremental refinements to it, again using pilot projects to test out the refinements. There will probably be several of these process improvement projects running simultaneously. This process represents the typical TWG life cycle for producing process improvements, and so is written from this point of view. The steps and processes for the software engineering process group (SEPG) and management steering group (MSG) are described primarily in Step 2.0, Manage the Software Process Improvement Program (page 43), which runs in parallel with this step.

Purpose   The purpose of this phase is to develop improvements and solutions to the process issues found during the baselining phase. The key processes and/or problems have been prioritized and selected during the previous phases; the process described in this step is where the actual work of providing refinements to the key processes or fixing those problems is performed. The results of this work will be turned over to the SEPG and MSG to include in the overall process improvement architecture and to project development teams to finally incorporate into their project execution.

Objectives   The TWG will

- Plan the project.

- Understand the process, including customers needs, and develop refinements to it (process orientation).

- Investigate the problem and develop a solution (problem orientation).

- Pilot a solution and validate and refine it.

- Develop rollout strategy and plan template for applying the solution.

- Evaluate the project.

- Re-iterate the cycle for further improvements.

Education   TWGs have communication needs similar to the assessment team and the SEPG when they start up. Specific TWG training needs are

- *Change management*, focusing on target readiness [suggested source: "Managing Technological Change" taught by the Software Engineering Institute (SEI)].

- *Team development*, focusing on building cohesive, successful implementation teams (suggested source: Scholtes, Peter R. *The TEAM Handbook: How to Use Teams to Improve Quality.* Madison, WI: Joiner, 1988; and associated classes from Joiner Associates).

- *Process improvement*, (suggested source: *TEAM Handbook* and associated classes from Joiner Associates).

Commitment   Since the TWG receives its charter from the MSG, overall commitment to the TWG charter is assumed. However, additional sponsorship and deeper commitment for the specific changes, staffing, and commitments of pilot projects, and building the capability of the organization to receive the TWG products, is needed. Commitment should come from several distinct groups:

- **Senior management:** The TWG must periodically refresh the commitment of the MSG through progress reports, clarification on issues and goals, and involvement in organization-wide decisions.

- **Middle management:** The TWGs must gain commitment from middle managers for their own time and the time required from pilot projects to develop solutions.

- **Line management** and **practitioners:** The TWGs will need to establish the commitment and consensus of those who will be implementing the process improvement as part of their product development projects. This requires getting early feedback and continuing to elicit input and gain agreement from the various projects on the content of the process improvement as well as how it is to be initiated and supported.

Communication

The TWGs have to communicate with those who support them. In addition, the TWG will be working with solution providers to get the best solution in the organization.

Specific communications:

- *TWG to SEPG:* primarily status updates and requests for information and assistance.

- *TWG to MSG:* primarily status updates and requests for re-source-level approvals; occasionally requests for arbitration/de-cisions affecting the organization that the TWG or the SEPG cannot make.

- *TWG to* **target groups:** The TWG must elicit requirements and feedback from the eventual target groups to ensure that the needs of these groups are met by the eventual solution. In addi-tion, the TWG should solicit interest in pilot participation from the affected target groups.

- *TWG to* **pilots:** For the TWG to get the appropriate feedback to refine the process improvement solution, significant communi-cation is required to ensure the proper execution of the pilot project.

Entry Criteria

- TWG charter and tactical action plan template from MSG/SEPG.

- Process maturity issues from baselining step.

- Related recommendations and "low-hanging fruit" (quick-fix, quick-return improvement projects) from baselining step.

- High-level process descriptions from process baselining step.

- Key process metrics from metrics baselining step.

Exit Criteria
- Completed pilots.

- Installation plan developed.

- Solution turned over to SEPG.

Tasks
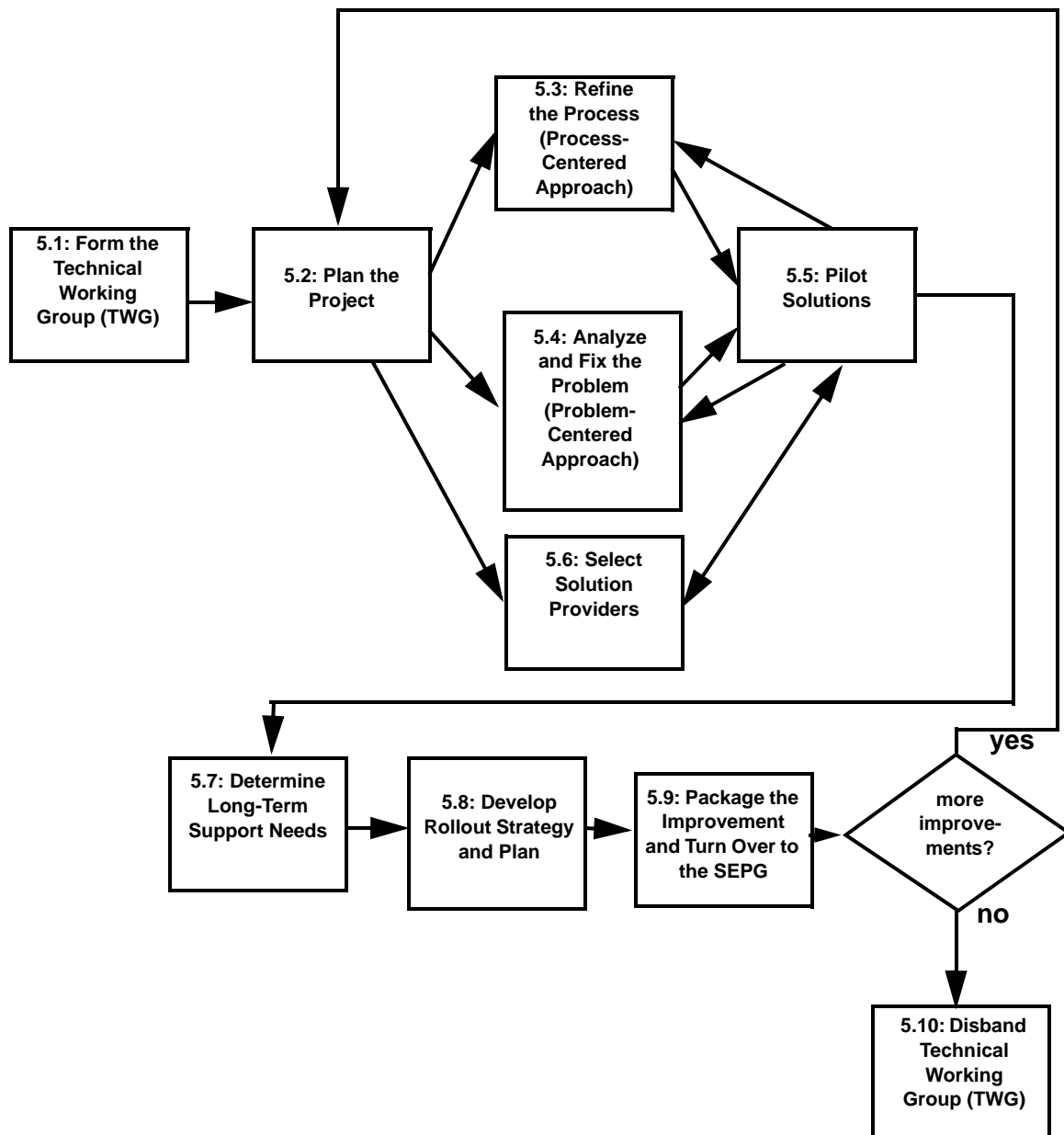See Figure 5-1: Activities in Step 5.0, Develop Improvements on page 107 for a pictorial representation of the tasks.

Figure 5-1: Activities in Step 5.0, Develop Improvements

The subtasks for 5.0, Develop Improvements, are

5.1 Form the Technical Working Group (TWG)

Purpose   For improvements that take more than a couple of days of one person's time and affect several people, a team approach usually works best. The team should be composed of volunteers from the target audience (those who will ultimately adopt the process improvement) who are enthusiastic about working on the improvement. This group of people can be identified during the baselining portion of the roadmap. In the recommendation-generating step of the maturity baseline, people can be asked to rank the alternatives by their own enthusiasm. When a particular solution area is decided upon, these people can be contacted to commit to the project "for real."

Objectives   Build a team from people with diverse backgrounds who all have a stake in the area of improvement.

Entry Criteria
- TWG charter and draft tactical action plan from MSG/SEPG.

- High-level process descriptions from process baselining step.

- Process maturity issues from maturity baselining step.

- Related recommendations and "low-hanging fruit" from maturity baselining step.

- Key process metrics from metrics baselining step.

Exit Criteria
- Team established.

Tasks
- Assign MSG sponsor responsibility to one MSG member. The TWG needs one person on the MSG to act as primary sponsor and advocate. This person is usually the process owner of the particular area the TWG is going to be improving. The MSG sponsor will have the responsibility to communicate issues about the TWG to other MSG members and to give feedback to the TWG from the MSG.

- Assign SEPG liaison responsibility to one SEPG member. The SEPG liaison

- Acts as facilitator or "quality advisor" (see Scholtes, Peter R., *The TEAM Handbook: How to Use Teams to Improve Quality*) to the TWG.

- Brings the data from the baselining steps to the other TWG members.

- Facilitates the flow of information between the various people and groups involved in process improvement, such as between the TWG and the MSG and other organizations, and among the team members themselves.

- Acts as the surrogate leader, when the TWG is beginning its work, until the designated or agreed upon TWG leader can take over.

- Get the enthusiastic people from the organization to work on the team. During the recommendations step, people prioritize improvements based on their enthusiasm for the improvement area. No commitment is implied at that time, however. Now that the improvement areas have been identified, the same people should be contacted to see if they are still interested. Their commitment and the commitment of their managers must be secured for them to work on the team.

- Plan and conduct a team kickoff meeting with sponsor attending. The first team meeting should be conducted with all TWG members, the SEPG liaison, and the MSG sponsor present to officially start up the TWG. Materials should have been exchanged before this time, but this is the official hand-off of the draft charter and tactical action plan from the MSG to the TWG. For other activities that should go on during the first meeting, refer to *The TEAM Handbook*.

- Set up initial schedule for TWG. The TWG should set up an initial schedule of working meetings to get through the next two or three steps.

5.2   Plan the Project

Purpose   Produce a draft tactical action plan that is reviewed with the MSG. The team's early efforts must be focused on narrowing the scope of the charter to the specific improvement on which they will work.

Objectives
- Complete the tactical action plan sections not specified by the MSG, and fill in other areas of the plan.

- Narrow the scope of the project to something that can be done in a finite amount of time.

Entry Criteria   Tactical action plan draft from MSG.

Exit Criteria   Tactical action plan approved by MSG.

Tasks
- Review draft tactical action plan with MSG sponsor and SEPG liaison.

- Review data from baselining phase with SEPG liaison.

- Develop task sorting and selection criteria.

- Explore problem area to get preliminary directions for the team.

- Create work breakdown structure (WBS) for TWG.

- Organize WBS tasks into a schedule with milestones and deliverables.

- Review and refine with MSG sponsor and SEPG liaison.

5.3 Refine the Process (Process-Centered Approach)

Purpose
The process-centered approach deals with understanding a specific key process identified during the baselining phase and applying incremental refinements to the process. This approach is useful for achieving long-term improvements in the process. However, because of the immediate pressures and uncertainties typical of lower level maturity organizations, it is difficult to maintain this focus in such organizations. Sustaining a process-centered approach requires strong management commitment and organization-al momentum and enthusiasm. The problem-centered approach is recommended for first-time process improvement programs.

Objectives
• Understand the process.

• Eliminate errors, reduce variations.

• Set up a continuous improvement cycle for the process.

Entry Criteria
• Process baseline and maturity issue data from the baselining phase.

• Tactical action plan.

Exit Criteria
Solution components identified: process descriptions, procedures, metrics, methods, and tools

Tasks
• Identify process stakeholders and understand their needs.

• Determine process scope / boundaries / context.

• Describe the desired state of the process (the "ideal").

• Determine process modeling objectives.

• Model the new process.

• Specify process metrics.

• Implement the process.

5.4   Analyze and Fix the Problem (Problem-Centered Approach)

Purpose   The problem-centered approach is distinct from the process-centered approach in that it is more useful for easily identifiable problems and can provide results faster than the process-centered approach. When problems become complex or solutions unwieldy, however, the results of the problem-centered approach are often overtaken by other problems that crop up when early problems are fixed. Because it will get the momentum up and keep enthusiasm alive, the problem-centered approach is useful for getting a SPI program started. However the process-centered approach will be more useful for long-term results.

Objectives   Develop solutions to specific problems.

Entry Criteria   •   Problem and issue data from the baselining phase.

                       •   Tactical action plan.

Exit Criteria   Solution components identified: process descriptions, procedures, metrics, methods, and tools.

Tasks   •   State the problem.

              •   Define solution goals and criteria.

              •   Identify constraints.

              •   Analyze the problem to determine root causes.

              •   Generate and select alternatives to address root causes.

              •   Define solution metrics.

              •   Implement solution.

5.5   Pilot Solutions

Purpose   Pilot projects are used to test out the solutions in both the process-centered and problem-centered approaches. The solutions will require some tailoring and refinement to fit them into projects across the organization, and the pilots will help determine the tailoring needs and guidelines for the rest of the organization. Several pilots may be run for a solution, and there may be several iterations between the solution development and piloting steps to get the solution ready for deployment across the organization.

Objectives   •   Verify the solution in a real project in the organization.

                     •   Capture learnings and results of pilot to refine the solution and the installation of the solution.

Entry Criteria   •   Solution components: process description, procedures, metrics, methods, and tools.

                     •   Training and installation needs identified and planned for.

Exit Criteria   •   Pilot project completion criteria are met.

                     •   Learnings and results of pilot captured and preserved by TWG.

Tasks   •   Develop pilot selection and completion criteria.

                     •   Identify potential pilot projects.

                     •   Select pilot project team.

                     •   Train pilot project team.

                     •   Install solution in pilot project.

                     •   Execute and monitor pilot project.

                     •   Evaluate results of pilot.

5.6   Select Solution Providers

Purpose   There may be several sources of support for the process improve-
                       ment solution, some competing, others complementary. Given the
                       organization's varying needs, the TWG must determine the best
                       source for support. During this phase the TWG should work closely
                       with the SEPG to use established and vetted solution providers.

                       This step runs in parallel with the solution creation steps. The solu-
                       tion provider(s) may be part of determining the solution, and in some
                       cases the selection criteria for providers may not be determined until
                       well into pilot testing the solution. Especially when several tools
                       may be competing, the TWG must establish working relationships
                       with various vendors to get the best solution for the organization.

Objectives   Investigate various providers of solutions and their solutions to find
                       ones that best match the needs of the organization, both short- and
                       long-term.

Entry Criteria   TWG has developed a set of solutions for the process issue at hand.

Inputs   • Problem descriptions and analyses.

                       • Description of solutions.

Exit Criteria   Designated solution provider(s) for the solution are ready to imple-
                       ment and provide support.

Outputs   Contract with solution provider(s).

Tasks   • Obtain contacts for providers of solutions (from SEPG).

                       • Contact providers and arrange briefing sessions.

                       • Develop selection criteria based on organization needs and range
                         of possibilities among providers.

                       • Narrow down the set of providers to one or two that best meet
                         needs and are ready to work with the organization.

- Develop contracts with solution providers.

5.7   Determine Long-Term Support Needs

Purpose   Long-term solutions will require long-term support. As the solution is implemented in other parts of the organization, new people will have to be trained, new problems may crop up, and additional tailoring may be needed. This step identifies the requirements for long-term support in terms of knowledge and skills required, how defects are fixed, installation and configuration consulting, etc. The improvement should be planned to last for a few years (possibly as part of some larger improvement effort). Ongoing support for any tools, methods, classes, materials, etc., should be planned during the development step.

Objectives
- Identify long-term support needs and potential sources for support.

- Plan internal long-term support mechanisms.
- Secure funding for long-term support.

Entry Criteria
- List of recommended solution providers from SEPG.

Exit Criteria
- Specific solution provider(s) chosen.
- Support contracts drafted.

Tasks
- Work with solution providers to satisfy needs of TWG and pilot solution.
- Refine TWG and pilot needs to enable best possible solution for entire organization.

5.8   Develop Rollout Strategy and Plan Template

Purpose   Once the solution has been designed and the short- and long-term support needs addressed, the solution will be ready to install in the organization. The TWG must create a plan that gives guidance to the development projects that will be installing the process improvement:

- What training they need.

- What tools and methods to acquire.

- Installation steps.

- How to get support, etc.

This plan will be used as a template by the project to integrate with their own project plans and by the MSG to integrate the improvement into the overall organization strategic plan for SPI and process architecture.

Objectives   Create installation plan template for the solution, to be customized by other projects during Step 6.0, Deploy Improvements (page 125).

Entry Criteria   • Successful pilot implementation.

Inputs   • Generic installation plan template.

- Guide for developing installation plan template.

- Guide for developing/integrating installation plans.

Exit Criteria   Installation plan template reviewed and approved by MSG, SEPG, and pilots.

Outputs   Installation plan template.

Tasks   • Using generic templates, create the installation plan for this particular solution.

- Review template with MSG/SEPG for approval.

- Integrate into process architecture of the organization.

5.9   Package the Improvement and Turn Over to the SEPG

Purpose   The TWG has developed several products and artifacts. These must be collected into a package that can be turned over to the SEPG for long-term maintenance and support. (This task will be much simpler if the TWG is doing this as it goes along.)

Objectives
- Collect and clean up all products and artifacts.

- Package products and artifacts for archival with the SEPG.

Entry Criteria
- Process improvement(s) are ready for distribution.
- Long-term support contracts are signed and solution providers are ready to implement solutions throughout the organization.
- Training and support is available for the organization.

Inputs
- TWG products and artifacts (minutes, notes, plans, templates, diagrams, charts, etc.).

Exit Criteria
- All necessary artifacts are collected in a single place for long-term support.
- SEPG accepts the package.

Outputs
- Bound (put in a notebook) and cataloged set of products and artifacts.

Tasks
- Identify various products and artifacts the team has produced.
- Collect clean copies of each product and/or artifact.
- Write descriptive material for those products and artifacts for which it is needed.
- Organize and catalog all the artifacts.
- Bind the products and artifacts into one package.
- Review package content with the SEPG.

- Archive the package with the SEPG, adding to its database of process improvement information and beginning the maintenance process on the package.

- Determine if more improvements should be made to this process. If so, then go back to 5.2: Plan the Project. Otherwise, go on to 5.10: Disband Technical Working Group (TWG). (See Figure 5-1 on page 107, the "more improvements?" decision.)

5.10   Disband Technical Working Group (TWG)

Purpose   The TWG has completed its tasks. As a final task, the TWG should also do a final retrospective report that will go to the SEPG and MSG to help improve the process for running and managing TWGs during solution development. Finally, the team should celebrate what it has accomplished.

Objectives   • Gather lessons learned from this effort.

                     • Celebrate the accomplishments of this team.

Entry Criteria   All improvements packaged and accepted by the SEPG for long-term support.

Inputs   • TWG reports and working records.

                     • Packaged improvements.

Exit Criteria   • Retrospective report delivered to SEPG.

                     • All team members' efforts recognized and rewarded.

Outputs   • Retrospective report.

Tasks   • Review the improvement project. Gather lessons from the TWG to improve the process of improving processes.

                     • Celebrate the completion of the tasks.

                     • Dissolve the team.

6.0   Deploy Improvements

Overview

This process puts an improvement into practice and spreads it across the organization. The various improvements that the working groups have been developing are complete and their value has been "proven" to the organization. The management steering group (MSG) and the software engineering process group (SEPG) will be managing and supporting the deployment of the improvements; their tasks are mostly in Step 2.0, Manage the Software Process Improvement Program (page 43), which runs parallel to this step.

This process links the mission of the SPI program to improve processes and the mission of the development organization to produce products. It is the culmination of the SPI efforts to this point.

As with Step 5.0, Develop Improvements (page 103), there may be more than one of these steps occurring in parallel. Unlike Develop Improvements, however, the multiple instances will be product-line organizations integrating several improvements or implementing one improvement at a time in serial fashion, depending on the rollout strategy and plan and the project circumstances. The multiplicity of improvement projects is handled in Step 2.0, Manage the Software Process Improvement Program (page 43).

This process entails the active adoption of specific improvements. There must also be a more passive, steady-state adoption of improvements, which should be embodied in the organization's **process architecture**. The line organizations should always design their project plans with the organization's process architecture in mind. They should apply variations only when data tells them they must or when they are deliberately adopting a new or modified pro-

cess by the method described below. We do not discuss this more passive adoption of process in this document.

Purpose

The purpose of this step is to install and institutionalize the process improvements coming from the working groups into the organization as a whole.

Objectives

- Bring line organizations "up-to-speed" on the improvement(s) they will be using.

- Integrate the process improvements with new or existing project development plans.

- Monitor and support the line organizations as they use the new or modified processes.

Education

The development teams will require some training in

- The new or modified process.

- Associated methods and tools.

- Some of the aspects of change management relating to target readiness, especially dealing with resistance and the responses to positive and negative change.

Commitment

The SEPG must keep working with both the MSG and the line organizations to ensure that the commitment to install and institutionalize the change exists and is strong enough. The MSG must secure the commitment of the development organization and cascade this commitment down to the line organizations. The line organization manager must secure the commitment of the project members to implement the change and get commitments from the SEPG for support during the transition.

Communication

The SEPG will be primarily responsible for technology transition of the change into the line organization. The MSG and SEPG communicate the rollout strategy and plan and specific process changes to the development organization. The SEPG works closely with the line organization to integrate the changes into the line organization's plans and activities.

Entry Criteria

- The changes are integrated into the organization's process architecture.

- A rollout strategy and plan, which integrates the installation plan created in the previous section with the overall SPI strategy, has been created and approved by the MSG and the development organization's senior management (it helps if these are same).

- Specific process improvement materials are ready for development teams to use.

- Training and ongoing support has been arranged for specific process improvements.

Exit Criteria   The rollout strategy and plan is fully executed.

The process improvement is institutionalized in the line organization.

Tasks   The subtasks for 6.0, Deploy Improvements, are

| Subtask	Page Number
6.1: Brief Entire Organization	129
6.2: Refine Rollout Strategy and Plan	130
6.3: Brief Project	131
6.4: Tailor Project Rollout Strategy And Plan	132
6.5: Train Project	133
6.6: Install Improvement	135
6.7: Use and Evaluate Improvement	137
6.8: Refine Deployment for Next Project	138
6.9: Ensure Long-Term Support	139
6.10: Transition to Long-Term Support	140
6.11: Evaluate Deployment	141
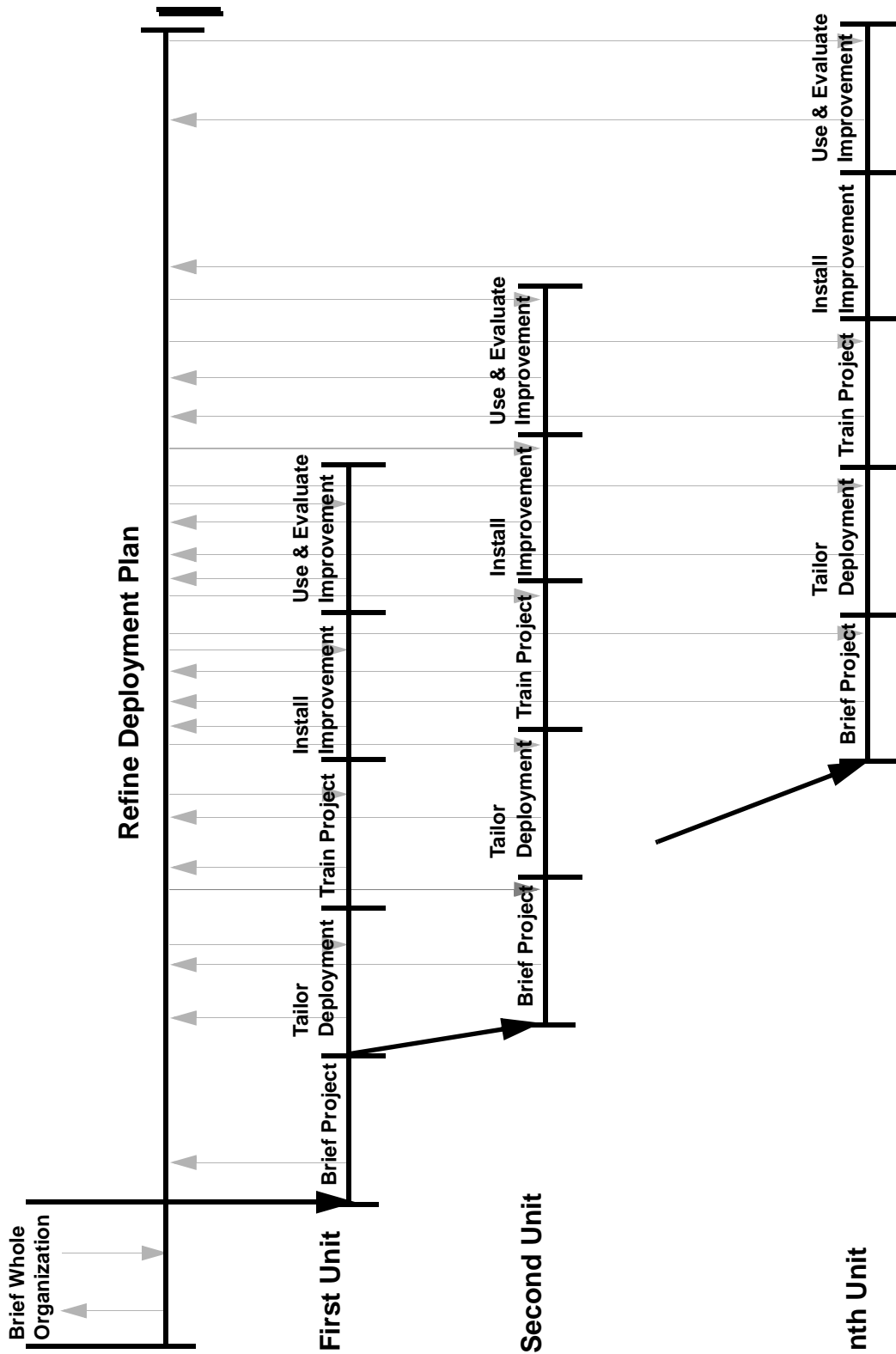
Figure 6-1: Gantt Chart Showing Phased Deployment Across an Organization.

6.1   Brief Entire Organization

Purpose   SEPG and MSG process owners brief the development organization on the change and the strategy for implementing the change. The development organization should have been kept informed on the progress of the working group during the solution development phase. The purpose of this briefing will be to announce to the organization the formal adoption of the change (or set of changes), explain the rationale for adopting the change, and explain the strategy for deploying the change across the organization. The MSG process owner is the primary sponsor for the change and must give (or lead) the briefing to show maximum support for the changes.

Objectives   • Inform the organization about changes in policy because of the adoption of process improvement(s).

• Inform the organization about the strategy for adoption, the benefits of the change, and the linkage to the organization's business goals and needs.

Entry Criteria   Process improvement included (i.e. documented) in the organization's process architecture.

Inputs   • Briefing kit/information.

• Deployment strategy.

Exit Criteria   Organization briefing completed.

Outputs   Feedback from the organization on the deployment strategy.

Tasks   • Plan and schedule briefings. The briefings should be planned and scheduled to cover the entire organization.

• Conduct briefings.

• Gather feedback from briefing participants.

• Revise future briefings based on feedback.

6.2   Refine Rollout Strategy and Plan

Purpose   Based on feedback from individual projects and the line organization as a whole, the SEPG and MSG process owners modify the rollout strategy and plan to better accommodate the organization's needs.

Objectives   Clarify and refine rollout strategy and plan, communicate to organization.

Incorporate lessons learned from the present deployment.

Entry Criteria   • Feedback has been provided from strategy briefings with the entire organization to modify the rollout strategy and plan.

• Rollout strategy and plan.

Exit Criteria   • Rollout strategy and plan is fully refined. (Refinement continues in parallel with the other tasks in this phase. See Figure 6-1 on page 128).

Outputs   • Revised rollout strategy and plan.

Tasks   • Gather feedback from other tasks in this section.

• Distill lessons learned and desired modifications from feedback.

• Incorporate lessons learned in rollout strategy and plan.

• Implement next task (or same task on next project) with new rollout strategy and plan.

• Communicate broad changes to entire organization.

6.3   Brief Project

Purpose   SEPG and MSG process owners brief individual organization
                     projects on the specifics of the change (what it is, why it is needed,
                     why they are to do it at this specific time, etc.). More detail about the
                     process improvement should be provided to the organization project
                     at the point when it will be expected to adopt the change (projects
                     will probably adopt at different times and rates).

Objectives   Describe how the process improvement is expected to fit into the
                     project.

Entry Criteria   • Briefing(s) of the entire organization have been completed.

Inputs   • Rollout strategy and plan.

Exit Criteria   • Project understands need for change and content of
                       changes.

Tasks   • Plan and schedule project briefings.

                     • Tailor briefing to specific project and set of changes.

                     • Conduct briefings.

                     • Gather feedback from briefings to refine deployment.

6.4   Tailor Project Rollout Strategy And Plan

Purpose   SEPG and project managers in the organization fill in the rollout
                   strategy and plan template for the specific changes to be integrated,
                   in the context of the overall line organization's plan(s). The process
                   improvement is tailored to the project's environment and circum-
                   stances. There will be additional tailoring as the project continues to
                   use the improvement.

Objectives   Tailor the process improvement plans to fit the project.

Entry Criteria ·   Project briefings completed.

Inputs   ·   Installation plan template.

Exit Criteria ·   Project agreement with tailored installation plan.

Outputs   ·   Tailored installation plan.

Tasks   ·   Using installation plan template, fill in appropriate dates, re-
                        sources, costs, names, etc., specific to this project's installation.

                   ·   Review the tailored installation plan with the project, getting
                        buy-in from affected targets for implementation.

                   ·   Review tailored installation plan with MSG.

6.5   Train Project

Purpose   The changes will require new skills and knowledge to be acquired by the line organization. To provide the maximum benefit to the line organization members, training and practice must be integrated into the project plans. SEPG and line organization managers arrange training and detailed briefings for line personnel in (new process, methods, tools, etc.

Although the tasks 6.5 (Train Project), 6.6 (Install Improvement), and 6.7 (Use and Evaluate Improvement) appear to be linear, they are usually done somewhat in parallel, and may take some iteration. For example, a tool may have to be installed for training to effectively be provided for it. Additionally, it may not be possible to identify certain needed skills until their absence becomes apparent. Although the order of these tasks represents an ideal situation, the actual implementation must be determined by the actual situation and environment.

Objectives   •   Plan the training for the project.

•   Schedule instructors and briefers.

•   Set up support relationships for the project.

Entry Criteria   •   Project agrees to installation plan.

•   Training resources are available to project.

Inputs   •   Installation plan for project.

Exit Criteria   •   Project is trained in specifics of this process change.

•   Project has ongoing support for installing and using changes.

Outputs   •   Completed training plan.

•   Modified support agreements that include project.

Tasks

- Assess project skills and knowledge in area of change.
- Plan curriculum to meet skills and training needs of people in the project.
- Schedule courses and enroll people from project.
- Conduct courses.
- Reassess project skills and knowledge, retrain as necessary.

6.6   Install Improvement

Purpose   Before a new tool, method, or process can be used, the associated
                      supporting environment must be installed. Various projects in the
                      line organization must tailor the solution to fit their environments
                      and needs. The installation is when the actual tailoring is performed;
                      the tailoring is planned for in Step 6.4, Tailor Project Rollout Strat-
                      egy And Plan (page 132). For lower maturity organizations in which
                      there is more variation across the line organization, more tailoring to
                      accommodate individual needs will be required. As the organization
                      moves up the maturity ladder, less local tailoring is required for or-
                      ganization-wide improvements.

Objectives   Ensure that the local project installs and can successfully use the
                      process improvement.

Entry Criteria   •   Installation plan for project is approved.

                      •   Project included in support contracts.

                      •   Project trained in specifics of process improvement

Inputs   •   Installation plan and support plans for the project.

                      •   Tools, artifacts, and documentation to support implementation
                          of process improvement.

Exit Criteria   •   Project has sufficient support for the improvement.

Tasks   Specific installation tasks vary widely depending on the nature of
                      the change. New tools require software upgrades, installations, file
                      system changes, etc., while a new procedure requires an update to
                      hard- and soft-copy documentation. The tasks listed here are very
                      generic and shouldn't limit the actual installation.

                      •   Plan and schedule installation, upgrades, etc., when they won't
                          affect critical project tasks.

- Carry out installation, upgrade, etc., verifying correct new operation in the given environment. Clean up any problems associated with the installation.

- Walk through new operation with affected people in the changed environment. Clean up any problems associated with the installation.

- Run through new operation at normal speed. Clean up any problems associated with the installation.

- Review installation with project for final approval.

6.7   Use and Evaluate Improvement

Purpose   The line organization starts using the new process, monitored by the
                       SEPG. At this point, the new process should be measured to validate
                       and refine the process installation. The metrics collected during the
                       solution development pilots should also be used during improve-
                       ment deployment.

Objectives   •   Run the project using the new or modified process.

                       •   Reinforce the new skills and knowledge.

                       •   Support the project in the new skills and knowledge.

Entry Criteria   •   Changes installed for use.

Inputs   •   New environment incorporating process improvement.

Exit Criteria   •   Project has institutionalized the improvement.

Outputs   •   Process evaluation metrics.

Tasks   •   Project uses the new environment in the normal course of its
                            work.

                       •   Project personnel record process metrics while using the new en-
                            vironment.

                       •   SEPG monitors project to ensure proper usage, giving support
                            and additional training where necessary.

6.8   Refine Deployment for Next Project

Purpose   The line organization and SEPG adjust implementation based on the data collected while monitoring the process adoption of the previous project. Based on the measures collected during execution, the process improvement may have to be modified for adoption by other projects.

Objectives
- Reduce sources of variation in new process.

- Incorporate lessons learned from previous project installation for next project.

Entry Criteria
- Previous project has installed and evaluated new process.

Inputs
- Installation plan for the project.
- Organization rollout strategy and plan.
- Installation plan template.

Exit Criteria
- Lessons learned incorporated into installation plan template and organization rollout strategy and plan.

Outputs
- Revised installation plan template.
- Revised organization rollout strategy and plan.

Tasks
- Ensure that problems are caused by the process and are not artifacts of some other problem.
- Review tailorings to see if they should become standardized. Update installation plan template and organization rollout strategy and plan as appropriate.

6.9   Ensure Long-Term Support

Purpose After adoption, the project will need ongoing support to maintain the process improvement in its project. Long-term needs must be anticipated to ensure adequate support.

Objectives
- Tailor a support contract for the project (possibly directly with solution providers).

- Ensure long-range funding for support.

Entry Criteria
- Generic support agreement with solution providers in place.

Inputs
- Support contracts.

Exit Criteria
- Project included in long-term support agreements with solution providers.
- Long-term support funded.

Outputs
- Revised support contracts.

Tasks
- Assess project-specific needs for long-term support.
- Revise support contracts to include project-specific needs.
- Secure funding for long-term project support.

6.10   Transition to Long-Term Support

Purpose   The process improvement should not require constant vigilance; if it does, it should to be retuned (or rethought). The development team should be able to continue without a lot of guidance and support, but should be able to call in expertise when needed. When the line organization demonstrates that it can repeatedly execute the new process, SEPG involvement falls back to an on-call support role, and the long-term support group takes over.

Objectives   Support the line organization in normal use of the process.

Entry Criteria   • Changes rolled out to all projects in the organization.

• Long-term support contracts and funding in place.

Inputs   • Support contracts.

Exit Criteria   • New environment makes existing contracts obsolete.

Tasks   • Line organization calls on long-term support instead of SEPG when problems arise, new training is needed, specific tailoring is required, etc.

• SEPG monitors long-term support contracts to ensure adequate support for line organization.

• MSG periodically reviews long-term support to ensure that proper funding and contractual commitments are being met.

6.11   **Evaluate Deployment**

Purpose   The line organization conducts a retrospective evaluation of the deployment use of the new process during their projects, giving the feedback to the SEPG to further refine the installation and deployment processes. By providing feedback to the SEPG, the methods and techniques used during the implementation can be incorporated into the next round of improvements.

Objectives   Gather lessons learned from deploying improvements and apply to future deployments.

Entry Criteria   Organization has fully deployed the improvement and has been using it for a few cycles.

Inputs   • Organization rollout strategy and plan.

                     • Installation plans for projects.

                     • Process metrics reports.

Exit Criteria   • Lessons from deployment captured.

                     • SEPG revises generic rollout strategy and plans and installation plan templates.

Outputs   • Retrospective report.

                     • Revised generic rollout strategy and plans and installation plan templates.

Tasks   • Plan and schedule retrospective meeting(s).

                     • Survey organization to collect top-level lessons, issues, and remaining actions.

                     • Compile retrospective survey results.

                     • Conduct retrospective meeting to clarify findings.

                     • Package retrospective findings and review with organization.

- Revise generic templates for rollout strategy and plans and installation plans.

- Develop action plan to resolve outstanding issues and finish remaining actions.

- Execute action plan and review results with organization.

A.0   Taxonomy of Software Process Improvement Plans and Charters

introduction   This taxonomy describes the planning documents built and used in the software process improvement (SPI) roadmap.

Plan Summary   (Parenthetical numbers in the *Plan Name* column refer to the section in this appendix in which the document is explained in more detail)

Plan Name	Purpose	Phase Where Generated	Responsibility	Audience
SPI Implementation Plan (A.1)	Provide information to launch SPI	1.0 Initiate Software Process Improvement 1.3 Build a Proposal	Software engineering process group (SEPG) leader	Management steering group (MSG), organization
MSG Charter (A.2)	Define mission of MSG	1.0 Initiate Software Process Improvement 1.6 Establish the Software Process Improvement Infrastructure 2.0 Manage the Software Process Improvement Program	SPI champion	MSG
SEPG Charter (A.3)	Define mission of SEPG	1.0 Initiate Software Process Improvement 1.6 Establish the Software Process Improvement Infrastructure 2.0 Manage the Software Process Improvement Program	MSG chair	MSG, SEPG

Table A-1: SPI Roadmap Plan Summary

Plan Name	Purpose	Phase Where Generated	Responsibility	Audience
Organization Strategic Plan for SPI (A.4)	Framework for SPI in context of the organization's business	1.0 Initiate Software Process Improvement 1.3 Build a Proposal 3.0 Build Software Process Improvement Strategy	MSG chair	MSG, organization
Organization Communication Plan (A.5)	Creates organization-wide awareness and involvement with the SPI program	1.0 Initiate Software Process Improvement 1.4 Educate and Build Support 3.0 Build Software Process Improvement Strategy	SEPG chair	MSG, organization
Baseline Action Plan (A.6)	Specify charter, scope, and deliverables for a specific baseline effort	4.0 Baseline Current State	MSG chair, TWG leader	MSG, SEPG, technical working group (TWG)
SPI Strategic Action Plan (A.7)	SPI framework in terms of organization business direction for short and long term	3.0 Build Software Process Improvement Strategy	MSG chair	MSG, organization
Tactical Action Plan (A.8)	Specify charter, scope, and deliverables for specific improvement efforts	2.0 Manage the Software Process Improvement Program	MSG chair, TWG leader	MSG, SEPG, TWG
Pilot Plan (A.9)	Define steps to install an improvement in a subunit of the organization	6.0 Deploy Improvements	TWG leader	MSG, SEPG, TWG, subunit managers and staff
Rollout Strategy and Plan (A.10)	Define strategy and plan for extending improvement to organization	6.0 Deploy Improvements	MSG chair	MSG, SEPG, TWG, organization managers and staff

Table A-1: SPI Roadmap Plan Summary

A.1   SPI Implementation Plan

Purpose   Define specific tasks, schedules, responsibilities, milestones, etc., involved in launching the SPI program from baselining through the completion of the SPI strategic action plan.

Contents
- Tailored version of the roadmap, specific to the particular client organization.

- Infrastructure description with role, responsibilities, and interfaces defined.

- Work breakdown with task description [ETVX (entry, task, validation, exit criteria) form], deliverables, and estimated resources.

- Training and communication activities needed.

- Estimated schedule with responsibilities.

- Assumptions and risks in SPI program.

A.2   MSG Charter

Purpose   Define mission of MSG.

Contents   • Purpose and objectives of MSG.

                   • Roles and responsibilities of members.

                   • Relationship to SEPG, existing management structures.

                   • Reporting and approval process.

                   • Resources and meeting schedules.

A.3   SEPG Charter

Purpose   Define mission of the SEPG.

Contents   • Purpose and objectives of SEPG.

                     • Roles and responsibilities of members.

                     • Membership: criteria, assignment, and rotation.

                     • Relationship to MSG, existing management structures, TWGs.

                     • Reporting and approval process.

                     • Resources and meeting schedules.

                     • Training requirements.

A.4   Organization Strategic Plan for Software Process Improvement (SPI)

Purpose
- Provide strategic business plan for the organization.

- Provide a framework for the SPI program (usually an initiative under the organization strategic plan).

Contents
- Introduction to organization history, product line, and culture.
- Executive summary.
- Vision, mission, and guiding objectives.
- Customer definition.
- Goals for product, process, people; short-term (one year of product cycle) and long-term (three to five years).
- Assumptions and risks.
- Infrastructure with roles, responsibilities, and interfaces defined.
- Criteria and measures of success.
- High-level description of competencies to be sustained and developed

A.5   Organization Communication Plan

Purpose   Create an awareness of the SPI activity. Describe the purpose and the benefits of the SPI program.

Contents   •   Introduction and overview.

                     •   Communication plan goals.

                     •   Assumptions and risks.

                     •   Communications agenda.

                     •   Messages, media, and audiences.

                     •   Resources and schedules.

A.6   Baseline Action Plan

Purpose   Specify charter, scope, and deliverables for a specific baseline ef-
                         fort.

Contents   •   Objectives/charter of the baseline working group.

                         •   Detailed description of the major activities and deliverables.

                         •   Interfaces and dependencies with other groups.

                         •   Work breakdown structure and schedules.

                         •   Assumptions, risks and risk management.

A.7   SPI Strategic Action Plan

Purpose   Describes a SPI framework in terms of organization business direction for the short and long term, as developed from the baselines and organizational vision and strategic plan.

Contents   For an explanation of the content categories below, see Section C.4, SPI Strategic Action Plan (page 184) in Appendix C.0, Charters and Templates.

- Overview
- Executive summary.
- Process improvement goals.
- Objectives.
- Assumptions and risks.
- Organization for process improvement.
- Responsibility matrix.
- Criteria for success.
- Improvement agenda.

A.8   Tactical Action Plan

Purpose   •   Identify the activities, schedules and deliverables of a TWG that will investigate and evaluate a process for improvement.

Contents   For an explanation of the content categories below, see Section C.5, Tactical Action Plan (page 188) in Appendix C.0, Charters and Templates.

- Introduction/overview.

- Objectives/charter.

- Detailed description.

- Resources.

- Interfaces/dependencies.

- Work breakdown structure (WBS).

- Schedule.

- Risks.

- Status/monitoring.

A.9   Pilot Plan

Purpose   •   Defines strategy for initiating an improvement within a project
                         or subunit of an organization.

Contents   The pilot plan is similar to the generic installation plan in Section
                      C.6, Installation Plan (page 188), tailored for piloting.

                      •   Introduction/overview: identifies the recommendation that this
                          pilot installation is addressing.

                      •   Goals, objectives, and purpose: describes the purpose of this
                          TWG.

                      •   Technology description; may be slightly different, since it also
                          evaluates an installation process.

                      •   Evaluation procedures: describes how to evaluate and tailor this
                          pilot installation into an organizational installation and rollout
                          strategy and plan.

                      •   Work breakdown structure (WBS): break overall task into sub-
                          tasks.

                      •   Schedule: defines expected milestones.

                      •   Resources: describes personnel, money, computer resources,
                          etc.

                      •   Risks: provide basis for contingency planning.

                      •   Status/monitoring mechanisms: describes how status is reported
                          and progress monitored.

A.10   Rollout Strategy and Plan

Purpose   •   Defines strategy for rolling out all improvements across the or-
                         ganization, based on lessons learned from pilot installation.

                     •   Defines criteria for determining what parts of the organization
                         will install improvements and when.

                     •   Defines what specific improvements will be installed, where,
                         and when.

Contents   The rollout strategy and plan is similar to the generic installation
                     plan in Section C.6, Installation Plan (page 188), tailored for rollout.

                     •   Introduction/overview.

                     •   Goals, objectives and purpose: describes what will be accom-
                         plished, why it is needed and who it applies to.

                     •   Technology description.

                     •   Tailoring: provides guidelines on how and when to do any tailor-
                         ing to technology and/or plan.

                     •   Education and training: describes what training (formal/infor-
                         mal) will be required.

                     •   Evaluation procedures: describes how to evaluate installation
                         and use.

                     •   Work breakdown structure (WBS): breaks overall task into
                         smaller, more manageable subtasks.

                     •   Schedule: defines key milestones.

                     •   Resources: describes resources required.

                     •   Interfaces/dependencies.

                     •   Risks.

                     •   Status/monitoring: describes how status will be reported and
                         progress monitored.

B.0　Components of the Software Process Improvement Infrastructure

Objectives

This appendix provides a brief discussion the three principal components of the software process improvement (SPI) infrastructure. The reader should become familiar with the roles and responsibilities that are outlined for each component.

The identified roles and responsibilities are only a starting point; they can be expanded or contracted to fit specific organizations.

In some instances benefit can be gained from having additional components to the SPI infrastructure. These components are described in B.4, The Software Process Improvement Advisory Committee (SPI-AC) (page 169) and B.5, The Executive Council (EC) (page 171). Typically these additional components are formed in organizational environments that are either very large and/or have wide geographical disbursement.

Purpose

Executive management will determine the size, scope, and responsibilities of the infrastructure to support the software process improvement (SPI) program. Taking into account such things as the organization's size, needs, strategy, and culture management will determine the number of layers, authority, and responsibility for each component and who should be represented within the infrastructure.

To build buy-in for the SPI program, the infrastructure is created and staffed with representatives from all parts of the organization. Involving all parts of the organization builds a feeling of ownership and participation in the program.

An example of an infrastructure is shown in Figure B-1 on page 160. The first of the three components shown is a management steering group (MSG), whose membership is drawn from the organization's

existing management structure. Reporting to the MSG is the software engineering process group (SEPG). The leader of the SEPG also participates as a non-voting member and sometimes serves as the facilitator for the MSG. Membership of the SEPG is drawn from the practitioners who are working on the projects in the organization. Depending on the size of the organization, SEPG membership can be on a full-time, part-time, or some combination of full- and part-time basis. In all cases there should be a full-time person leading the SEPG. Reporting to the MSG with dotted-line relationship to the SEPG are the technical working groups (TWGs). Membership on the TWGs is drawn from those areas of the organization that would be affected by any recommendations for improvement change made by the TWG.
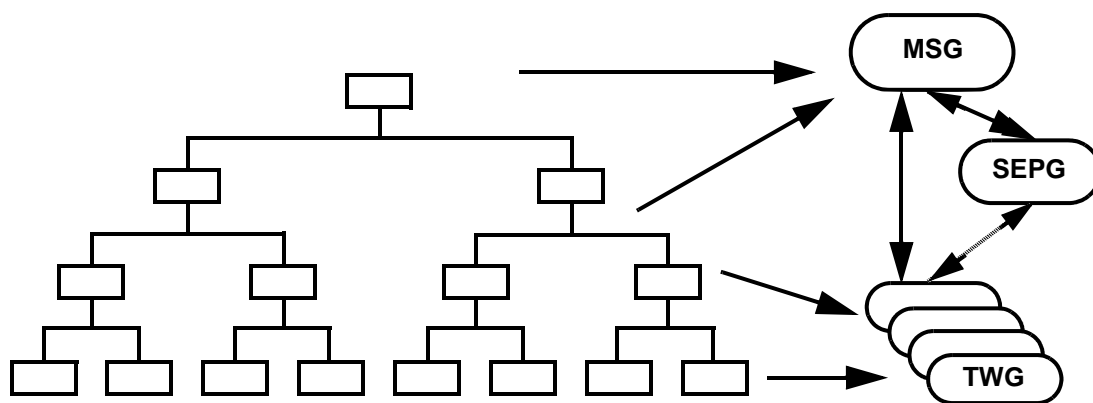
Figure B-1: Example of Infrastructure

The components that make up the SPI infrastructure each have a specific role in the SPI program. The infrastructure that is created should be sized based on the needs of the SPI program. Care should be taken that the size and shape of the infrastructure does not get in the way of the SPI program. Each component has a scope of clearly

defined duties and responsibilities. Figure B-2 below is an expansion of the infrastructure to support a SPI program.
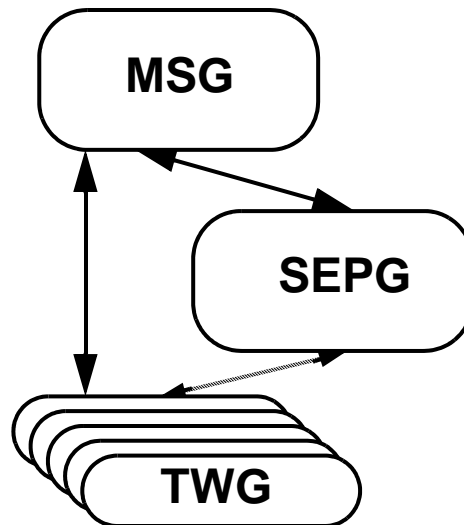
Figure B-2: Expansion of Infrastructure in Figure B-1

B.1   The Management Steering Group (MSG)

Objectives
- Link SPI program to organization's vision and mission.

- Allocate resources and insure work distribution.

- Monitor implementation results and provide corrective actions as necessary.

Purpose

The MSG is made up of the management team that represents the highest level of management in the organization. Its purpose is to guide the SPI implementation activities in the organization. The MSG will establish the goals and objectives and set the direction and priorities for the SPI program. The MSG should also apply improvement activities to the existing management processes.

The MSG will supply the resources necessary to carry out the SPI program. It will

- Charter TWGs for specific process improvement.

- Approve training to support the SPI program.

- Determine the measurement and success criteria used to evaluate the program.

The MSG will also serve to resolve issues that arise during the SPI program that cannot be handled by the SEPG and TWGs. The MSG removes barriers to the SPI program and creates a recognition and reward structure to recognize the efforts of the people involved in accomplishing the process improvement.

The MSG is made up of the senior site manager, as chair, and other members drawn from his or her management team. The MSG meets monthly, probably more frequently in the early stages of the SPI program, moving toward a fixed monthly schedule. It would be a good practice to have the SEPG leader be the facilitator for the MSG meetings. The meeting is mandatory for all MSG members and operates formally with agendas, minutes and action items. By its ac-

tions the MSG can demonstrate to the organization its commitment and support of the SPI program.

The MSG will exist for the duration of the SPI program. Members may change as the organization changes and matures, but the roles and responsibilities to the SPI program will remain.

Tasks   Activities that will be performed by the MSG include

- Approve SPI strategic action plans.

- Establish TWGs.

- Draft TWG charters.

- Draft tactical action plan.

- Hold monthly meetings (2-4 hours).

- Review results of baselining activities.

- Allocate resources.

- Monitor working group progress.

- Approve broad installation of improvements, dependent on results of pilot activities.

- Report progress to executive council (EC).

- Facilitate EC meetings.

███████████████████████████████████████

B.2   The Software Engineering Process Group (SEPG)

Objectives   • Facilitate SPI throughout the organization.

                        • Track and report status of SPI programs.

                        • Serve as focal point for organizational learning.

Purpose   The SEPG is the focal point for the organization's SPI program. It is
                        responsible for and facilitates the activities that relate to software
                        process improvement, such as action planning, process improve-
                        ment, technology improvement, and other activities. The SEPG also
                        exchanges information between the organization's SPI program and
                        the programs of other SEPGs across the country. The SEPG coordi-
                        nates and plans all of the organization's SPI programs. The SEPG
                        also leads the organization's improvement efforts.

                        The SEPG maintains an organizational awareness of the overall SPI
                        effort and serves as a facilitator to insure the successful completion
                        of improvement activities. As the catalyst for the SPI program, one
                        of the biggest challenges for the SEPG is to maintain the motivation
                        and enthusiasm for process improvement across and between all lev-
                        els of the organization.

Facilitate SPI   Facilitating SPI throughout the organization means that the SEPG
Throughout the   has to obtain and maintain management support for the initiative at
Organization   all levels and across all functionality. The SEPG is assisted in ac-
                        complishing this by working with the MSG to demonstrate commit-
                        ment to practitioners and management of the organization.

                        The SEPG will facilitate software process assessments and, along
                        with the organization's management and practitioners, will develop
                        the SPI strategic action plan to guide the efforts. The SEPG will also

facilitate other baselining activities to provide definition for existing process definitions and measurement activities.

Provide Process Consultation

The SEPG supports the line managers and development projects by providing process consultation when required. It also works closely with the line managers and projects to provide guidance and support when new improvement changes are being introduced. It can assist the line organizations in evaluation of new technology and can also help plan for the introduction and transition to new technologies.

Track and Report SPI Progress

Another activity of the SEPG is to monitor all of the SPI activities that are under way in the organization. The SEPG will report the status of the various improvement activities that are in progress to the MSG. The SEPG should establish and maintain a process database for retaining the various artifacts that result from the improvement activities. Timely reporting of SPI status will allow the MSG to make informed decisions that will support and enhance the success of the SPI program.

Serve as Focal Point for Organizational Learning

The SEPG will also serve as the focal point of the organization's SPI activities. It will arrange for or conduct training in process improvement and continuing education in other subjects relevant to the SPI program. From the process database, the SEPG will be able to maintain and disseminate lessons learned as a result of the SPI program.

Size

The SEPG should be staffed at a full-time level that is equivalent to 1 - 3% of the organization's development staff. In some smaller organizations (fewer than 100 professionals) at least one person, the SEPG leader, should be devoted full time to SEPG responsibilities. From time to time, the SEPG will need additional resources to function effectively.

These resources can be "borrowed" from the line organizations on a part-time basis. Assignments to the SEPG are usually made for a fixed period of time, on the order of one to two years, after which the

practitioners return to their line organizations and their place on the SEPG is filled by another practitioner.

Membership   Characteristics of members of the SEPG include experience as a software development practitioner, sound knowledge in one or more domains, and respect of their peers in the line organizations.

The members must support the SPI program, championing it to the rest of the organization. They must also have the capability to effectively serve as agents of change as new and improved processes and technologies are introduced to the organization.

SEPG members are critical to the success of the SPI program. It would be a good practice for the MSG to set up a screening and/or interview process for SEPG membership. This would help ensure that members have the proper background, experience, and enthusiasm for the job.

In most organizations members of the SEPG are on temporary assignment ranging from one to two years. Although they may return to their regular jobs, the SEPG continues.

Tasks   Some of the tasks that are performed by the SEPG are

- Hold weekly meetings
- Identify and recommend improvement activities to MSG.
- Track and report progress of improvements to MSG
- Determine effectiveness of improvements.
- Develop and maintain process database.
- Develop training plans and arrange for training.
- Provide consultation to projects.
- Facilitate software process assessments (SPAs).
- Facilitate MSG meetings.

B.3 The Technical Working Group (TWG)

Objectives
- Document current processes.

- Assess current processes.
- Improve current processes.
- Develop plan to pilot improved process.
- Pilot the new improved process.

Purpose
TWGs are the solution developers for the SPI program. They are formed to address a specific area in the overall improvement process. Their responsibility is to address a specific area for process improvement, and they are given a charter, resources, and authority to complete their activity.

The purpose of a TWG is to improve the process that it has been chartered to evaluate and improve. The TWG is formed by the MSG to address a specific process area. To properly carry out its job, the TWG must be given proper guidance by the MSG. This is documented in its charter, which defines a clear mission, states the objectives, and delegates authority to accomplish the mission. Also implied is a commitment of necessary resources and the support of management to get the job done.

The TWGs can address processes at any level in the organization. They can be made up of managers, addressing high-level, cross-functional processes, or they can be made up of practitioners, addressing lower level, single-function processes. Key to the membership of the TWG are that the members are drawn from staff who

- Are knowledgeable about the process being evaluated.
- Work in the process.
- Would be affected by changes made for the improvement of the process.

The leader of the TWG should be the owner of the process that is being evaluated. For example, a TWG formed to evaluate and improve the testing process would have the Manager of Testing as the TWG leader. Other members of the TWG would be selected to provide alternative perspectives to the process being studied. Having TWG members who are either customers of the process or suppliers to the process is also beneficial. If possible the members of the TWG should be volunteers as opposed to being assigned to the team. This will ensure that the team members have an expressed interest in the activity. Participation on a TWG also provides for broadening of support and additional buy-in to the improvement activities.

The frequency of TWG meetings varies. Some teams meet weekly for an hour at a fixed time and day. Other teams may meet every other Tuesday for four hours. Regardless of the frequency, the meeting is mandatory for all team members, is very focused, and is fast moving. The team follows a formal agenda, and at the end of the meeting time is reserved to evaluate the meeting. It will take a few meetings for the team to get to know and be comfortable with each other before they start functioning effectively. If possible it would be a good idea for the first one or two meetings to be devoted to instruction on team concepts and meeting effectiveness.

Tasks   Activities that are performed by a TWG include

- Research problem and identify solutions.

- Formulate solution.

- Revise tactical action plan to fit selected solution.

- Present possible solutions to MSG along with proposed solution.

- Select initial prototype group.

- Begin prototyping.

- Evaluate results of prototype.

- Revise tactical action plan with lessons learned from prototype. This becomes the rollout strategy and plan.

B.4   The Software Process Improvement Advisory Committee (SPIAC)

Objectives

The main objective of a software process improvement advisory committee (SPIAC) is to provide an organizational forum for sharing information regarding the SPI activities that are being undertaken by different parts of the organization. Additionally the SPIAC can

- Advise management on SPI matters.
- Establish common positions on critical SPI issues.
- Identify the benefits of SPI implementations.
- Identify the requirements for SPI implementations.
- Maintain the process database for items that are suitable for implementation across all locations.
- Maximize the sharing of SPI resources across the organization.
- Participate with external organizations and software process improvement networks (SPINs) for SPI programs.

Purpose

The purpose of the SPIAC is to support the long-range process improvement activities of the organization by facilitating interaction among the organization's SEPGs, promoting information-sharing and providing a mechanism for the SEPGs to address common problems.

The SPIAC can be a very valuable resource for those organizations that have multiple SEPGs. These SEPGs may be operating in the same or different geographical locations. The SPIAC will provide the organization a vehicle for sharing information about the organization's SPI programs. Each member site of the SPIAC will contribute lessons learned and reports of successful improvement activities, which will benefit other SEPGs in the organization. Much valuable information can be exchanged: techniques used for improvement activities, technology evaluations, vendor experiences, etc.

The purpose of an SPIAC is to foster communication. Each of the participating sites has learned some valuable lessons as it has progressed. Having a forum where these lessons can be shared along with successful improvement activities will benefit the entire organization. Member sites will be able to capitalize on work that has already been done at other sites.

SPIACs should meet quarterly. At the beginning of the SPI program, it would be advantageous to meet more frequently to resolve all of the start-up issues such as charter, officers, length of term, etc. Meeting duration is at least one full day as there will be plenty of work to accomplish. Occasionally the meeting may last for two days.

Overall membership includes all members of all of the organization's SEPGs, with one voting member for each SEPG represented.

Meetings can be held at different SEPG sites on a rotating basis. Thus the host site and others in close proximity may have more than one representative attend the meetings. Remote sites would be represented by as many SEPG members that the site could afford to send, but at least one member, preferably the SEPG leader should attend each meeting.

The chair of the SPIAC is elected for a term of one to two years. The chair is responsible for the agenda and for coordinating the meeting activities, schedule, location, and so forth. The site hosting the meeting is usually responsible for the local arrangements, meeting minutes, and other activities necessary to facilitate the meeting.

Tasks   Activities of the SPIAC include

- Hold regularly scheduled meetings (quarterly).

- Share lessons learned with other SEPGs.

- Share solutions developed with other SEPGs.

- Establish common position on critical SPI issues.

- Advise management on global SPI matters.

- Identify benefits of SPI implementations.

- Maximize the use of SPI resources across the organization.

B.5   The Executive Council (EC)

Objectives   In a very large organization that has many divisions scattered geo-
                     graphically addressing SPI issues independent of each other, man-
                     agement oversight is required. The executive council (EC) serves
                     this purpose, monitoring and evaluating these efforts from the point
                     of view of the total organization.

Purpose   The EC is concerned with how the overall improvement efforts tie
                     in with the vision and mission that the organization has set for itself.
                     Typically the EC reviews the SPI and other process improvement ef-
                     forts with knowledge of the corporation's future directions and
                     guides the SPI program to support that vision.

                     The EC wants to ensure that the overall improvement efforts, includ-
                     ing SPI, are proceeding in a direction to support the corporate vision.
                     To support its direction for the organization, the council may elect
                     to communicate certain broad improvement strategies down the in-
                     frastructure chain of command to guide the improvement efforts.
                     This broad guidance, based on strategic opportunities, becomes
                     more focused moving down the SPI infrastructure. The divisions or
                     individual business units can enhance and add focus to the guidance
                     from the EC based on the product produced and market opportuni-
                     ties in their business environments.

                     Membership on the EC is kept very small. There are no more than
                     three to five members who are the organization's most senior man-
                     agement.

                     Meetings should be held semi-annually. At the meetings, members
                     of the EC review and discuss the progress of the SPI programs.
                     Changes in direction or focus should be communicated to the infra-
                     structure.

Tasks   Some of the activities performed by an executive council include

- Hold meetings as necessary (semi-annually).

- Evaluate progress of SPI activities against defined criteria.

- Review SPI activities against business needs.

B.0   Components of the Software Process Improvement Infrastructure
B.5   The Executive Council (EC)

C.0   Charters and Templates

Purpose   A charter is an important document in a software process improve-
                         ment (SPI) program. A charter serves as an agreement or contract
                         between two parties. On one hand, the charter makes explicit the au-
                         thority and responsibility of the entity being chartered and defines
                         the scope and mission. On the other hand the charter conveys com-
                         mitment from and implied support by the chartering entity.

                         The first part of this appendix contains examples of actual charters
                         that are in use by organizations that are pursuing software process
                         improvement.

                         The second part of the appendix contains templates that can be used
                         in the planning activities. There are templates for a strategic action
                         plan used by the organization in planning its SPI activities
                         (page 184), a template for a tactical action plan used by TWGs
                         (page 188), and a template for an installation plan used to install an
                         improvement (page 190).

                         It should be remembered that these are only samples and sugges-
                         tions. What works in some organizations may not work in others.
                         Readers should tailor these instruments to fit their organizations.

C.1   Management Steering Group Charter

Generalized Research Company - Electronics Group

Research, Development, and Engineering Center

Software Engineering Division

Cooperstown, New York

Management Steering Group (MSG) Charter

14 November 1991

1. **PURPOSE:** The purpose of this Charter is to:
   - Establish the GRC-EG Software Engineering Division (SED) MSG for Software Process Improvement.

   - Define the mission, responsibilities, membership, and conduct of operations for the MSG.

2. **SCOPE:** This Charter applies to all organizations and personnel, including sub-contract personnel, located at the Electronics Group, Cooperstown, New York.

3. **AUTHORITY:** Director, Software Engineering

4. **MISSION:** To support the operation of the Software Engineering Process Group and the execution of the approved Action Plan for software process improvement within SED. Utilizing the Software Engineering Institute's (SEI) Software Process Assessment (SPA) methodology, SED's goals and objectives are to identify key areas for process improvement and to propose a framework for improvement actions consistent with the SED vision for software process improvement. It will also include oversight support of Total Quality Management (TQM) initiatives.

5. **MANAGEMENT STEERING GROUP RESPONSIBILITIES:**
   - To approve the establishment of Technical Working Groups (TWGs).

   - To approve and support the membership of TWGs.

   - To provide guidance to TWGs work in progress.

   - To support the implementation of approved recommendations.

   - To Approve TWG initiatives and recommendations.

   - To terminate TWGs, as appropriate.

6. **MEMBERSHIP:**

Director, GRC-SED (Chair)	Assistant Director, GRC-SED
Director, Systems Support	Director, Operation and Engineering
Manager, Applications Development	Manager, Network Development
Manager, Customer Support Center	Manager, Quality Assurance
Manager, Systems Software Development	Manager, Documentation Development

7. **ASSOCIATE MEMBERSHIP:** Manager, SEPG

8. **CONDUCT OF OPERATIONS:**

- The Management Steering Group will meet bi-monthly or as called for by the Management Steering Group Chairman.

- Meetings will have a formal agenda distributed at least three days prior to the meeting and all meetings will be documented.

9. **TERMINATION:** Not applicable.

_____

Daniel A. Gibson

Director, Software Engineering Division

C.2   Software Engineering Process Group Charter

General Research Company - Electronics Group

Research, Development, and Engineering Center

Software Engineering Division

Cooperstown, New York

Software Engineering Process Group (SEPG) Charter

12 December 1991

1. **PURPOSE:** The purpose of this Charter is to authorize and approve:

    a. The establishment of a Software Engineering Process Group

    b. Membership

    c. Conduct of operations

2. **SCOPE:** This Charter applies to all organizations and personnel located at the Electronics Group, Software Engineering Division, Cooperstown, New York.

3. **AUTHORITY:** Director, Software Engineering

4. **MISSION:**

    a. To manage the Electronics Groups process improvement program.

    b. To organize and initiate the prioritized actions in the approved Electronics Groups Action Plan.

    c. To facilitate and monitor the development and implementation of process improvements.

    d. To create an atmosphere to foster change.

5. **RESPONSIBILITIES:**

    a. Oversee process improvement activities and report progress.

    b. Serve as Electronics Group's Change Agent.

    c. Lead Electronics Group Software Process Assessments (SPAs).

    d. Facilitate action planning.

e. Oversee Electronics Group's TQM Program.

f. Facilitate and advise Technical Working Groups (TWGs).

g. Provide for training necessary to promote TQM and process improvement to maintain an atmosphere receptive to change.

h. Serve as focal point for coordination of Electronics Group process improvement activities with SEI, Corporate headquarters, and sub-contractor organizations.

i. Oversee activities of all Electronics Group SEPGs.

6. **MEMBERSHIP:** The Software Engineering Process Group membership consists of Core Members, and Review Members. Membership will be re-established during the planning phase for the next Electronics Group SPA effort. The identification and responsibilities of Software Engineering Process Group members are defined below:

a. Core Members will participate 100 percent of their time excluding leave and required administrative duties. The Core Members shall perform the majority of overseeing implementation of the Action Plan toward process improvement. The Core Members are:

> David Rimson, SEPG Manager
>
> John Sibling, SEPG Member
>
> Renee Doyle, SEPG Member
>
> Barbara Cott, SEPG Member
>
> Janet Dempsey, SEPG Administrative

b. Review Members will contribute up to 10 percent of their time. The Review Members are a representative group of managers and practitioners who meet as required to provide insight, additional data, and consensus on the implementation of the Action Plan. Review Members will also act as a focal point to identify experts within their organization on particular topics.The Review Members are:

> Systems Support, C. Royce
>
> Applications Development, T. Royce/J. Hasek
>
> Customer Support, R. Davidson
>
> Systems Software, P. Thomas
>
> Operations & Engineering, R. Fichter, D. Jockel
>
> Network Development, T. Dzik

Quality Assurance, J. Potoczniak

Publications, M. Burkitt

7. **CONDUCT OF OPERATIONS:**

a. The SEPG will report to and receive guidance from the Assistant Director, Software Engineering Division, Electronics Group.

b. SEPG will hold regular meetings as required.

c. The SEPG will keep the Division Director, Assistant Director, Division management, and Sub-contractor management informed via regular reports through the Assistant Director.

d. The SEPG will facilitate TWG Meetings.

e. The SEPG will present periodic status reviews and conceptual briefings to the Management Steering Group (MSG).

f. The SEPG Chair will be an associate member of the MSG.

8. **EXPECTED PRODUCTS:**

a. Documented processes and procedures on the execution of the Division's software processes

b. Status review briefings to MSG

c. TWG Status Reports

d. Newsletter input to Software Engineering News

e. Monthly update newsletter on electronic mail

f. Presentations to Division workforce on process improvement

g. Process improvement promotional materials

h. Process improvement metrics reports

9. **MILESTONE PLAN:** To be presented and approved by the MSG at the first meeting.

10. **TERMINATION:** The SEPG will function indefinitely.

_____

Daniel A. Gibson

Director, Software Engineering Division

C.3   Software Process Improvement Advisory Committee Charter

Corporate Accounting Services (CAS)

Software Process Improvement (SPI)

Advisory Committee (AC)

Charter

1. **PURPOSE**. The purpose of the CAS SPI Advisory Committee (SPIAC) is to support the long-term process improvement activities of the SEPGs by facilitating interaction among the CAS SEPGs which will promote information sharing and provide a mechanism for the SEPGs to address common problems.

2. **SCOPE**. This Charter applies to the membership of the SPIAC and joint activities of the individual SEPGs established by CAS. The scope of this charter is to:

> a. Delineate the mission of the SPIAC
>
> b. Define the concept of operations
>
> c. Define the membership

3. **MISSION**.

> a. Provide a forum for sharing of process improvement issues, information, successful practices, and lessons learned among the CAS SEPGs.
>
> b. Advise CAS management on process improvement matters.
>
> c. Establish joint positions on critical software engineering process improvement issues.
>
> d. Identify benefits of and requirements for process improvement implementation across the SEPGs.
>
> e. Maintain software engineering process definitions, improvement methodologies, improvement tools, and process improvement metrics that are suitable for implementation across the centers/sites.
>
> f. Maximize the sharing of available Software Engineering Institute (SEI) and other process improvement resources across CAS SEPGs to include coordinating common education on process improvement.
>
> g. Participate with government organizations, industry, academia, and Software Process Improvement Network (SPIN) process improvement efforts.

4. **CONCEPT OF OPERATIONS**.

    a. The SPIAC will conduct its activities in an atmosphere of non-attribution.

    b. The following roles will be established for the functioning of the SPIAC: facilitator, member, scribe, minute taker, time keeper, host, and technical advisor. The specific responsibilities for these roles will be agreed to by the SPIAC.

    c. The SPIAC will meet quarterly, and will be scheduled, if possible, to coincide with the annual SEPG National Meeting and the annual Software Engineering Symposium. SPIAC meetings will coincide with CAS Directors' meeting as necessary.

    d. Site and agenda for each meeting will be determined by mutual consent of the SPIAC.

    e. SPIAC members will execute tasks as agreed upon during meetings.

    f. SPIAC can recommend supplemental PATs/working groups for software process improvement.

    g. Reports, recommendations, and minutes will be submitted to the CAS Directors.

    h. All SEPG members are welcome to attend all meetings. One SEPG member will be designated to represent each site, with all attendees having equal voice discussions.

5. **MEMBERSHIP**.

    a. The recognized CAS SEPG sites are as follows:

            CAS West, San Diego

            CAS South, Atlanta

            CAS East, Philadelphia

            CAS International, New York

    b. Membership is open to all SEPG members from these sites.

    c. The Software Engineering Institute is invited to attend SPIAC meetings in a technical advisory role.

6. **REVISION**. This charter will be reviewed and revised as deemed necessary by the SPIAC and its sponsors.

7. **TERMINATION**. The SPIAC will function continuously until such time as it is no longer needed.

8. **SPONSORS**.

_____

David F. Wilson

Director, CAS West

_____

William Johnson

Director, CAS South

_____

James W. Davison

Director, CAS East

_____

Robert Smithwell

Director, CAS International

C.4   SPI Strategic Action Plan

Purpose   This plan provides an introduction to the SPI program with context
                     and background for how the organization has arrived at this point.

- It is based on baseline findings and recommendations report.

- It describes the motivation and direction for addressing the findings within a SPI program.

- It defines long-range and near-term goals.

Contents   The suggested sections in the SPI strategic action plan are identified
                     in the left column and comments are in the right column.

1. Overview   Provide context and background on how the organization arrived at
                     this point.

2. Executive   Explain how this action plan will integrate all software process im-
   Summary   provement activities at this center.

- Explain how the current improvement efforts will be linked to recommendations from the assessment and how those efforts and future efforts will be integrated, coordinated, and tied to the vision.

- Explain also that this strategic action plan will provide answers to the following questions: (*Note*: Examine these questions. If they are not the right ones for your organization, change them. Make sure that there are sections within the plan that address each question, however.)

  - What are our goals for the SPI program?

  - What is our motivation to improve?

  - What assumptions are we making?

  - Who are the players?

  - How will we measure successes?

- How will we continue to improve?

3. Process
Improvement
Goals

- Define the long-term (3-5 years) and short-term (1 year or prod-uct cycle) goals for the improvement program.

- List the strategic goals that have been developed as a result of the assessment (e.g., productivity, quality, risk, maturity goals from the action plan structure materials).

- List the strategic goals that have developed from the vision or other sources. (*Note*: Keep goals few, concise, unambiguous, and measurable.)

4. Objectives

First, describe *why* this SPI program is important and why anyone should care and want to do anything.

- List the principal motivations (e.g., increase competitiveness, avoid consolidation or closure) that will drive the SPI program.

- State the objectives (e.g., to improve the quality and productivity of the organization's products, services, and resources) and the consequences of maintaining status quo.

Second, define the guiding principles to be followed during the SPI program to achieve the goals and objectives (e.g., using the SPI pro-gram to model higher maturity behavior. Look at the next maturity level and determine how those key process areas can be applied and used in the SPI program itself.)

5. Assumptions and
Risks

- List critical assumptions (e.g., sponsorship, work load, resource availability) and describe how each affects the plan.

- Discuss the risks implied by these assumptions.

- Identify the barriers, including the non-technological barriers, to the improvement program and describe the strategies to reduce those barriers. (*Note*: If using the Managing Technological Change implementation plan, tie it in here.)

6. Organization for Process Improvement	• Define and describe the infrastructure that is in place or being created to support the improvement program.
	• Describe the organizational entities (e.g., MSG, SEPG, etc.) created to support process improvement in terms of their composition, roles, responsibilities, and interfaces. Reference the charters for these groups and attach those charters to Section 9, Improvement Agenda.
	• Identify the sponsor and what current resources are committed. (*Note*: this is summarized from the resources identified in Section 9.)
7. Responsibility Matrix	• Describe which group is responsible for what throughout the SPI program
	• List the SEPG coordinating activities with the MSG and TWGs.
	• Describe which group is responsible for what throughout the SPI program.
8. Criteria for Success	• Describe how the goals from Section 3 (Process Improvement Goals) will be measured and how the organization will recognize success in achieving those goals.
	• Describe how improvement activities will be measured and evaluated at both the organizational and project levels.
9. Improvement Agenda	This section provides the *what* of the action plan. The efforts are described at a high level, resource requirements are identified, and the relationships between each major activity are described so that the reader can see how these different activities are integrated.
	• Provide a high-level description of all current improvement efforts in terms of what they are doing, what resources are currently committed to the activity, and what resources are required to complete the activity.
	• Describe how the above existing activities map to the recommendations from the assessment. Identify any gaps, partial or otherwise, between the recommendations and the current improvement activities.
	• Provide a high-level description of all additional improvement activities that will be needed to completely address all of the recommendations and achieve the goals and objectives of this action plan. This description should be expressed in terms of what

each activity will accomplish and what resources are required to accomplish the activity.

- Define how activities will be prioritized and what the priority and selection criteria will be.

- Identify how improvement projects will be selected to participate in the SPI program.

C.5   Tactical Action Plan

Purpose   This plan identifies the activities, schedules, and deliverables of a TWG.

The plan also discusses resource requirements; interfaces and dependencies with other groups; assumptions, risks, and risk mitigation; and schedules and milestones.

- Specify the charter and scope the effort of the TWG.

- Guide the TWG efforts.

Contents   The suggested sections in the tactical action plan are identified in the left column and comments are in the right column.

1. Introduction/   •   Identify the recommendation that this plan will support.
   Overview

                          •   Provide an overview of what must be accomplished.

2. Objectives/   •   Describe the objectives and purpose of this working group.
   Charter   (*Note*: If this information already exists in the form of a charter, that document should be appended to the action plan.)

                          •   Describe the scope of the working group's efforts.

3. Detailed   •   Provide an accurate and concise description of the task.
   Description

                          •   Include a definition of what the task is and a list of the major activities and artifacts associated with it.

4. Resources   Describe resources required for this task, including personnel, money, computer resources, etc. Also describe who is responsible for each task.

5. Interfaces/   Each working group has an interface with other groups. Define and
    Dependencies   document these interfaces in this section.

6. Work Breakdown   Break the overall task into small, manageable pieces that can be used
    Structure (WBS)   as the basis for planning, identifying milestones, reporting, and con-
                        trol.

7. Schedule   •   Describe when each of the task elements described in the WBS
                            are to be completed. Use Gantt or PERT charts.

                        •   Key accomplishments should be made into milestones and
                            tracked against original estimates.

8. Risks   Provide a basis for risk management and contingency planning.

9. Status/Monitoring   •   Describe how status will be reported. (*Note*: Completed status
                            reports should be appended to the tactical action plan to maintain
                            a history of all activity.)

                        •   Discuss how progress will be monitored (comparisons of actual
                            progress against proposed schedules).

                        •   Discuss how significant schedule deviations or changes will be
                            handled.

C.6   Installation Plan

Purpose

This plan will define the steps necessary to install an improvement into a subunit of the organization. The plan will contain the objective and purpose of the improvement, a WBS of the activities, schedules, resource requirements, and criteria for success.

Contents

The suggested sections in the installation plan are identified in the left column and comments are in the right column.

1. Introduction/ Overview

- Identify the technology to be installed that this plan will support.

- Provide an overview of what must be accomplished.

2. Goals, Objectives and Purpose

Describe what will (should) be accomplished, why it is needed, and what kinds of projects or functional areas it applies to. (*Note*: goals should be measurable.)

3. Technology Description

- Provide an accurate and concise description of the technology.

- Include a definition of what the technology is and a list of the major activities and artifacts associated with using that technology.

4. Tailoring

- Provide guidelines on how and when to tailor this technology and this installation plan.

- Define the mandatory requirements and the optional components or requirements.

- Define options in terms of types of projects, types of functional areas, etc.

5. Education and Training

- Describe what training (formal or informal) and education is (a) required and (b) desirable for installation and use of this technology.

	• Define where and when this training or education is available, costs, lead times for reserving training seats, the process to be followed to request the training, and from whom it is requested.
6. Evaluation Procedures	Describe how the project or functional area will evaluate their installation and use. How will they know they have it right?
7. Work Breakdown Structure	Break the installation into small, manageable pieces that can be used as the basis for planning, reporting, and control. Define entry conditions and inputs, task descriptions, validation criteria, and exit conditions and outputs for each task.
8. Schedule	• Describe when each of the task elements described in the WBS are to be completed. Use Gantt or PERT charts.
	• Make key accomplishments into milestones and track against original estimates.
9. Resources	Describe resources required for this task, including personnel, money, computer resources, etc. Also describe who is responsible for each task.
10. Interfaces/ Dependencies	Each working group has an interface with other groups.
	Defined and document these interfaces in this section.
11. Risks	Provide a basis for risk management and contingency planning.
12. Status/Monitoring	• Describe how status will be reported. (*Note*: Completed status reports should be appended to the plan to maintain a history of all activity.)
	• Discuss how progress will be monitored (comparisons of actual progress against proposed schedules).
	• Discuss how significant schedule deviations or changes will be handled.

D.0   Establish Organization Process Maturity Baseline

Purpose   There are many different ways to conduct an internal assessment of an organization's strengths and weaknesses. Organizations have used a variety of assessment methods in the past, and new variations are constantly being developed. A variety of assessment methods is needed because of the differences between organizations: size, previous assessment activity, funds available, and so on. Rather than describe just one method, this appendix describes a generic series of assessment activities based on the Software Engineering Institute (SEI) software process assessment (SPA) methods. The intent is to provide an understanding of the types and kind of activities involved in conducting an assessment. The software engineering process group (SEPG) should determine the type of assessment it wishes to conduct and get training on that method.

The organization process maturity baseline establishes the software process maturity level of the organization and identifies key areas for process improvement. The SEPG usually plans, organizes, and leads its organization's assessment. Following the assessment, the SEPG formally documents the results of the assessment in a final report. The assessment team typically consists of the SEPG and other assessment team members, drawn either from outside the assessment site or from within the assessed organization.

A key step of a capability maturity model (CMM)-based SPI program is identifying where the organization fits on the maturity model. These activities identify a set of key issues that, if addressed, can launch the organization on the road to improvement. This phase can be considered successful if two goals are met:

1. A reasonable set of issues is identified and agreed upon by all involved, and recommendations are developed to move the organization down the road to improvement.

---

2. The organization becomes excited and interested in making changes at all levels, from the lowest practitioner to the senior manager. This phase contains some of the most stressing moments for the SEPG, both internally and in its relationship to senior management. It is this "cauldron" that can either forge the SEPG into a high-performing team or can break the team. The latter, if it occurs, usually leads to dissolution of the SPI program.

Objectives
- Prepare the team and organization for conducting the assessment.

- Gather information on the organization's software process maturity level, identify key process issues facing the organization, and start to develop a set of priorities for improvement.

- Generate a document detailing all results of the assessment, including the findings that were presented during the final findings briefing at the on-site period and recommendations for addressing those findings.

- Increase involvement and commitment throughout the organization.

- Identify barriers to change within the organization.

- Continue team building for the SEPG.

Entry Criteria
- The baseline method for software process maturity assessment has been selected.

- A team has been established and resources committed to conduct the SPA.

Tasks
See Figure F-1 on page 194 for a pictorial representation of the tasks.

D.1 Prepare for Assessment	→	D.2 Conduct Assessment	→	D.3 Develop Baseline Findings and Recommendations Report
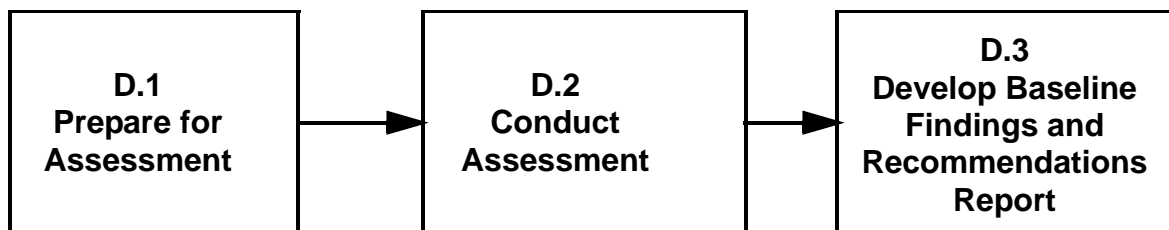
Figure F-1: Establish Organization Process Maturity Baseline—Subtasks

The subtasks for D.0, Establish Organization Process Maturity Baseline, are

Subtask	Page Number
D.1: Prepare for Assessment	196
D.2: Conduct Assessment	199
D.3: Develop Baseline Findings and Recommendations Report	201

D.1   Prepare for Assessment

Purpose   The purpose of this activity is to lay the groundwork for a smooth
and successful assessment. A critical initial activity is to establish
the scope of the assessment by identifying the parts of the organiza-
tion that will be assessed and that will participate. This is usually fol-
lowed by selecting a team that represents those parts of the organi-
zation to be assessed and training that team in the specific assess-
ment method chosen. Key assessment dates must be negotiated and
finalized, such as dates for

- Initial data-gathering and analysis.

- Detailed interviewing and definition of issues.

- Development of recommendations.

- Delivery of final report.

Then the participants, particularly the projects and functional area
representatives, must be selected and briefed on their roles and ac-
tivities. The bulk of the organization to be assessed must understand
what will happen and how it relates to the SPI program. Typically
this information is conveyed through a series of briefings. Detailed
plans should be developed for all steps of the pre-assessment, assess-
ment, and post-assessment periods.

Objectives   - Get a team trained in the SPA method selected.

- Determine the scope of the assessment and select projects and
functional area representatives to participate in the assessment.

- Make the bulk of the organization to be assessed aware of what
an assessment is, how it fits into the overall SPI program, and
what will happen in terms of activities and outputs during and
immediately after the assessment.

- Finalize dates for the key assessment events and develop de-
tailed plans and schedules for all activities.

- Prepare all logistics, materials to be used, files, templates, brief-ings, etc., and ensure that all tools, equipment, and materials are ready and in place.

Entry Criteria   A team has been established and resources committed to conduct the SPA.

Education/Training   A training session for an assessment team occurs during this phase. The purpose is to train a team in the specific mechanics and skill re-quirements of the selected assessment method as well as to provide any required background information.

Communication   Two groups have responsibility for most communications during this period: the management steering group (MSG) and the SEPG.

The MSG should publicly sponsor and support the assessment, pref-erably through individual staff meetings and at group briefings.

The SEPG will conduct informational briefings for the organization as a whole on what the assessment is, how it relates to the SPI pro-gram, and what will be happening. This is typically done through briefings to sections of the organization, with most of the people in that section attending along with the section's manager.

The SEPG should also brief the selected participants on their roles, responsibilities, detailed schedules, and the overall assessment pro-cess, concentrating on how the participants' information is to be used.

Exit Criteria   All preparations are completed for the assessment. Invitations have been issued, **functional area representatives (FARs)** and project leaders are briefed, everything is scheduled and ready to go, and a complete dry run of the process has been satisfactorily com-pleted.

Tasks   The subtasks for D.1, Prepare for Assessment, are

- Determine scope of the assessment.

- Select and train team in the assessment method chosen.

- Set expectations.

- Determine assessment participants.

- Finalize assessment dates, plans, and schedules.

- Prepare and test logistics for the assessment.

- Hold dry run or team walkthrough of the assessment process.

- Plan development activities for final report.

D.2   Conduct Assessment

Purpose   The purpose of this activity is to conduct the assessment. This typi-
                     cally starts with an opening participants' briefing for all assessment
                     participants, where the events, objectives, and schedules are re-
                     viewed. The maturity questionnaire is filled out by the selected par-
                     ticipants, and then the assessment team analyzes the responses to the
                     questionnaire. The assessment team then prepares questions and ar-
                     eas to probe further for the detailed interviewing and issue definition
                     period and decides what supporting material it will need to examine.
                     The team finalizes plans and logistics for this follow-up period and
                     then begins it.

Objectives   •   Gather information on the organization's software process ma-
                         turity level, identify key process issues facing the organization,
                         and start to develop priorities for improvement.

                     •   Build consensus on the issues facing the organization and devel-
                         op excitement and enthusiasm for making necessary changes.

                     •   Publicly report on the issues facing the organization and the
                         strengths to build upon.

Entry Criteria   All preparations are completed for the assessment. Invitations have
                     been issued, FARs and project leaders have been briefed, and every-
                     thing is scheduled and ready to go.

Communication   Five groups have responsibility for most communications during
                     this period: senior management, middle management, the assess-
                     ment team, project leaders, and FARs.

                     Senior management should publicly sponsor and support the assess-
                     ment process and ensure that their line managers support the process
                     as well, particularly by allocating time for the participants. Senior
                     management also should emphasize that open and honest responses
                     are desired and should accept and acknowledge the findings.

                     Middle management should support the process and ensure that any
                     of their people who are participating in the assessment process are

able to be at their assigned activities on time and without interruptions.

The assessment team will be providing information to the participants on the process and detailed schedules. In addition, they provide feedback to participants and formally present the assessment results to the organization.

The project leaders will be providing information about their projects and giving feedback to the assessment team about completeness, accuracy, and credibility of the findings.

The FARs will be providing their perspective on issues that get in the way of accomplishing their jobs. They will also identify strengths and provide feedback to the assessment team on the completeness and accuracy of the findings.

Exit Criteria   The on-site period has been successfully completed.

Tasks   The subtasks for D.2, Conduct Assessment, are

- Brief assessment participants.

- Administer maturity questionnaires and gather responses.

- Analyze responses and determine questions to be asked during interview periods as well as areas to probe in more depth.

- Finalize plans and logistics.

- Finalize preparation of supporting materials to be used during the interviewing period.

- Conduct detailed interviews and hold focus group discussions with selected participants.

- Identify issues and rank them.

- Gather feedback on the issues identified and refine them as necessary.

- Prepare and present a briefing to the management team and the organization as a whole on the strengths and issues identified and their consequences.

D.3   Develop Baseline Findings and Recommendations Report

Purpose   The purpose of this activity is to document the findings in more detail than was presented in the assessment period briefing and to develop recommendations to address those findings.

Typically the recommendations are developed through a series of brainstorming or focus group sessions held with practitioners, middle-level, and senior-level managers. The participants in each session are asked to brainstorm recommendations for each findings category. They are then asked to identify those recommendations that could be simply and easily implemented in a short period of time. Volunteers are solicited to start working on some of those simple improvements.

The assessment team then consolidates the recommendations from all the sessions and creates final categories and descriptions of recommendations. The findings and recommendations are combined into a report, which is circulated through the assessment team, the MSG, and other selected key stakeholders for review and comment. The revised findings and recommendations are combined with the plans for the action planning phase, and this report is delivered, along with a briefing, to senior management.

Objectives   • Increase commitment of different levels of the organization by involving practitioners and middle and senior management in the process of developing recommendations.

• Develop recommendations for the organization to address the findings identified during the assessment period.

• Identify simple, inexpensive improvements that can begin immediately, launch those efforts, and start to track them.

• Submit a report and briefing of the assessment team's findings and the composite organization's recommendations to senior management.

- Secure senior management commitment to proceed to the next phase, action planning.

Entry Criteria   The on-site period has been successfully completed.

Communication   Four groups have responsibility for most communications during this period: the MSG, middle management, the SEPG, and practitioners.

The MSG should publicly sponsor and support the recommendations process and ensure that lower level managers support the process as well, particularly by allocating time for the participants. Senior management also should provide input on recommendations in the senior management brainstorming session. Lastly, senior management will provide feedback and review on the report.

Middle management should support the process and ensure that people who are participating are able to be at their assigned activities on time and without interruptions. Middle managers should also provide their inputs on recommendations during their brainstorming session.

The assessment team will be consolidating information on recommendations, generating details on the findings and consequences, and facilitating the brainstorming sessions. They will consolidate, distribute, and brief the report.

The practitioners should provide their inputs on recommendations.

Exit Criteria   The baseline findings and recommendations report has been delivered and briefed to senior management, and a commitment has been received to proceed to the next phase.

Tasks   The subtasks for D.3, Develop Baseline Findings and Recommendations Report, are

- Generate first draft of findings fragments.

- Conduct recommendations brainstorming or focus group sessions with practitioners, middle management, and senior management.

- Cluster, categorize, and merge recommendations.

- Generate first draft of recommendations fragments.

- Distribute, review, and update first draft with the MSG and other selected stakeholders.

- Develop briefing.

- Distribute, review, and update final draft report and briefing.

- Deliver report and brief recommendations.

Glossary

baseline action plan	Plan that specifies the charter, scope, and deliverables for a specific baseline effort.
Baseline findings and recommendationsreport	Report describing the current state in a specific area, with prioritized recommendations.
capability maturity model (CMM)	A description of the stages through which software organizations evolve as they define, implement, measure, control, and improve their software processes.
discovery team	Team that explores issues and develops an SPI proposal to senior management.
executive council	Group in large organizations that defines strategy and direction for the organization's process improvement efforts.
functional area representative	Representative of a specific software functional area (e.g. configuration management, testing, coding, etc.) who contributes to a discussion group during a software process assessment (SPA).
installation plan	Plan that defines steps for installing an improvement in a subunit of an organization.
line management	The first and second level of management in a medium to large organization whose focus is on the day-to-day activity of the organization.
management steering group (MSG)	Group responsible for linking the SPI program to the organization's vision and mission, demonstrating sponsorship, allocating resources, monitoring progress, and providing guidance and correction.

management steering group (MSG) charter	Document that defines the mission of an MSG.
middle management	Those levels of management between senior management and line management in a medium to large organization whose focus is on short- to mid-range business activities.
organization communication plan	Plan for creating organization-wide awareness and involvement with the SPI program.
organization strategic plan for software process improvement (SPI)	Framework for SPI in the context of the organization's business.
organization vision	A mental image of what an organization will be when its goals have been accomplished.
pilot	Initial implementation of an improvement, usually on a small, controlled scale, before general installation.
pilot plan	Plan that defines the steps for conducting a pilot in an organization.
practitioner	A person who is working within the software development framework.
process	The means by which people, procedures, methods, equipment, and tools are integrated to produce a desired result.
process action team	See *technical working group (TWG)*.
process architecture	Framework within which the software development activities are performed.
process database	A repository of artifacts containing records of the data gathered and generated during the SPI process.

rollout strategy and plan	Definition of the strategy and plan for extending improvement to the organization.
senior management	The top manager and his/her direct reports in a medium to large organization. Senior management focus is typically on the longer range business activities.
software engineering process group (SEPG)	Group chartered by management to build and reinforce sponsorship of SPI, nurture and sustain improvement activities, and ensure coordination of the SPI effort throughout the organization.
software engineering process group (SEPG) charter	Document that defines the mission of an SEPG.
software process improvement (SPI) strategic action plan	Plan—based on the results of the baselining efforts, the organization improvement goals, and the resources available—which provides guidance for the overall SPI program and addresses how the long-range organization goals will be reached.
software process improvement advisory committee (SPIAC)	Forum in large or geographically disbursed organizations in which multiple SEPGs share experiences, lessons learned, and improvements accomplished.
software process improvement (SPI) briefing	Briefing held to build awareness of and support for SPI.
software process improvement (SPI) implementation plan	Plan that provides information necessary to launch a SPI program
software process improvement network (SPIN)	A group of individuals banding together to explore their common interests related to software process improvement.

software process improvement (SPI) proposal	Proposal that provides information to management that is necessary to launch a SPI program.
stakeholder	Person who has a specific interest and would be affected by decisions and/or changes in his or her areas of interest.
strategic business plan	Plan that specifies the business mission, business goals, and strategy the organization will pursue for achieving them.
tactical action plan	Plan that specifies charter, scope, and deliverables for specific improvement efforts.
target group	A group on which attention is focused with the intention of influencing them to change the way they approach their work.
technical working group (TWG)	Groups created to address a particular focus of the SPI program.
technical working group (TWG) charter	Document that defines the mission of a TWG.

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The Software Process Improvement Roadmap is the product of a strategic collaboration between the Carnegie Mellon University Software Engineering Institute (SEI) and the Hewlett-Packard Company. The information in the roadmap is based on the application of software process improvement practices and the lessons learned from these experiences. Concepts in the roadmap were proven with the SEI client base within the Department of Defense and the internal Hewlett-Packard clients.

This document describes a generic software process improvement (SPI) program roadmap, a long-range, integrated plan for initiating and managing a SPI program. The purpose of this document is

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to provide process improvement managers with a generic description of the recommenced steps for SPI.